The Electrical Industry's Weekly Magazine

February 13, 1956

Electrical World

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The Changing Rural Market

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NEWS ABOUT PEOPLE . . . Page 38

E B POWER GS
UNIVERSITY MICROFILMS
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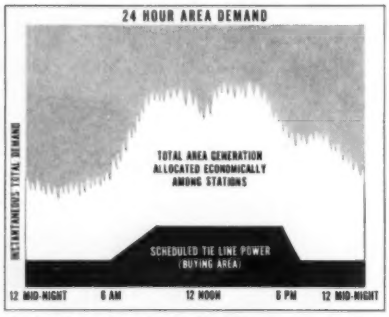
ANN ARBOR MICH

Increase in operating economy is assured as world's first fully automatic dispatching system goes on the line. Here, J. A. Keeth, Vice President, Kansas City Power & Light; C. M. Sagmoen, G.E.; H. S. Day, Manager—G.E. Specialty Instrument Sales, discuss automatic features that permit instant balancing of system's units.

First fully automatic load dispatcher heralds new horizons in utility power system economics



TPYICAL DAILY LOAD CURVE can now be fed more efficiently. The automatic dispatching system even calculates transmission losses.

BASIC DESIGN CONCEPTS began with work on such computers as this network analyzer. Here, G. Kron and Dr. L. K. Kirchmayer discuss system integrating with S. B. Crary (left), Mgr.—Analytical Engineering, in early planning stage of new system.

New system computes generator, transmission costs, allocates load for lowest fuel costs, reduced man-hour expenses

Biggest advance to date toward helping electric utilities realize optimum system operating economy is the world's first fully automatic load dispatching system. Developed for Kansas City Power & Light Company by G-E engineers, the new system computes the costs of electric power generation and recognizes transmission losses, balances the output of the system to provide immediate and most economical meeting of widely varying loads, reducing fuel and man-hour requirements.

HOW IT WORKS

From an operating standpoint, the new automatic dispatching system considers operating efficiency and capacity of each turbine-generator plus widely varying transmission costs. With this information, the new system continuously distributes the load most economically among the machines. As a result fuel costs are held to a minimum. And, since detailed loading schedules are not required, manpower is relieved of routine calculations.

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The K.C.P.&L. system represents important progress toward helping utilities cut generation and transmission operating costs to an absolute minimum. Today, system interconnections and pool operation make automatic control increasingly desirable. For more data on how your company can achieve greater operating efficiency, contact your G-E Apparatus Sales Representative, or write for GEA-6296 to the General Electric Company, Schenectady 5, N. Y. 301-314

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ELECTRICAL WORLD

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Electrical World

Published for 82 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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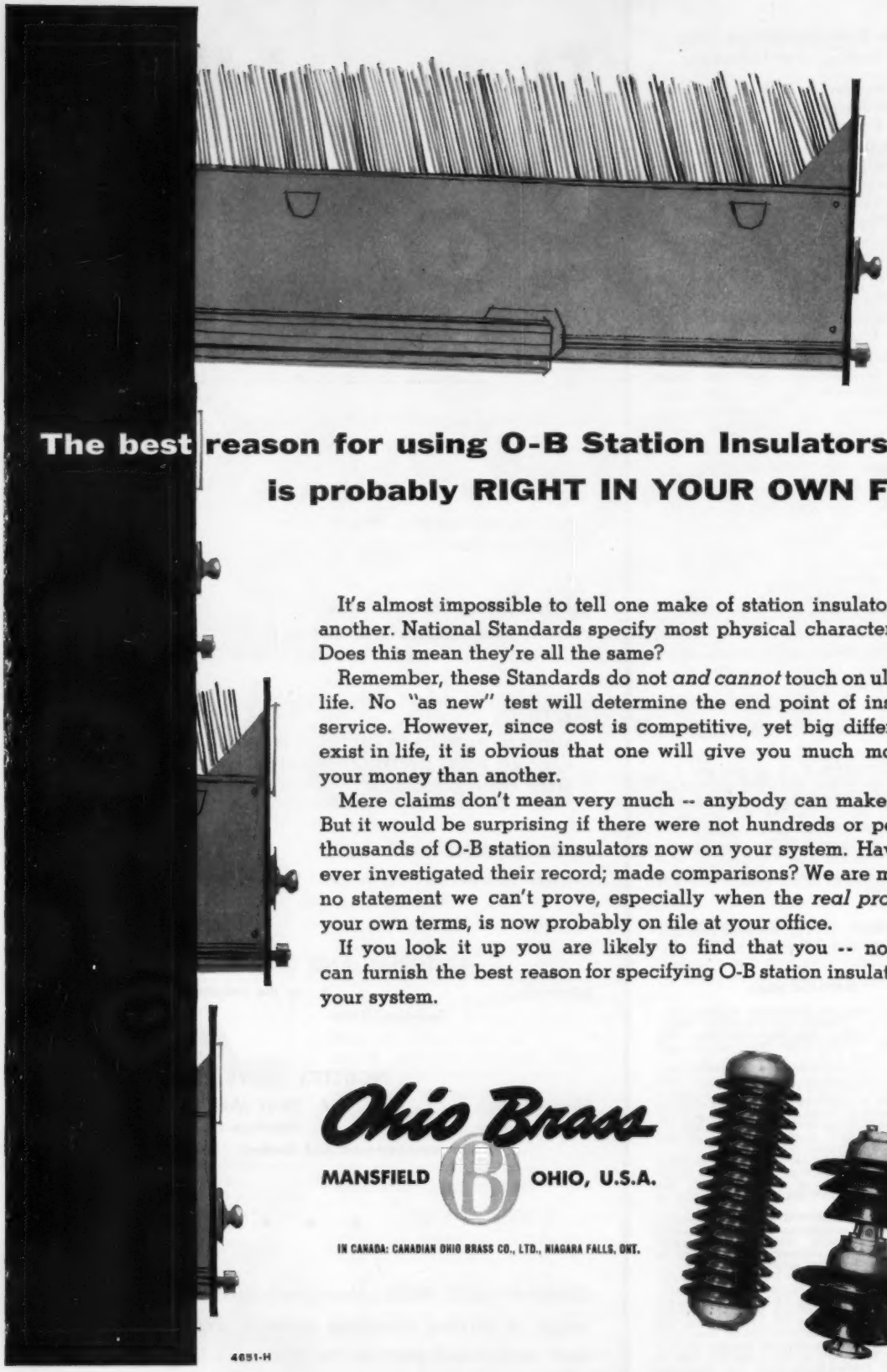
COMING NEXT WEEK—How are utilities meeting the challenge of serving shopping centers? EW's survey of 124 such centers will provide the answer.



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EDITORIALS

Look Ahead at the Rural Market

Primary aim of the special report beginning on page 21 is to put the promising rural power market in true perspective. From the electric utility viewpoint this market may be divided into two classes: farm and non-farm. Both are dynamic elements in the economy, and both present challenges to utility sales forces and engineering departments.

There are several significant features in the farm market picture of general interest. While total farm income is down, per capita farm income has edged upward. While number of farms has declined, the average size of the farm has grown. The mounting U. S. population is constantly increasing its demands for farm products.

In the nation as a whole utilities may anticipate about the same or possibly some fewer farm customers in a decade than they have today. However, the remaining farms will have to turn to greater mechanization to help meet increasing needs. In many cases this mechanization will require electric power. The trend is such that one electric company president has suggested that the larger farms be classed as industrial customers.

Fully as important to utilities serving rural areas is the continued push of the suburbs into the farm lands. Last summer's potato patch is bulldozed aside to make room for a new housing development. Former farm homes now house the city worker. Rising disposable income makes it possible for the employees of urban industrial and commercial enterprises to move to the suburbs. Decentralization of industry also contributes to this rural movement.

While statistics are much less complete for the suburban population than for the farm population, it is possible to draw some general conclusions. On the average they will probably be more financially able than urban dwellers, and many will choose electric service in preference to other services even if these should be available. These factors will contribute to a higher average use of electricity by this group of customers.

Utility sales forces must be geared to sell increased electrical mechanization to a comparatively stable farm population. At the same time they must continue to promote electrical home appliances and equipment to an ever expanding non-farm population.

AIEE Winter General Meeting

The winter general meeting of the American Institute of Electrical Engineers was a spectacular success. It featured the largest technical program ever organized for an Institute meeting. More than 5,000 engineers and engineering students attended and participated. All members owe a debt of gratitude to those who helped plan and carry out the five-day convocation.

Of the 100 technical sessions scheduled, more than one-third were directly related to the electric utility field. Thought-provoking and sometimes controversial papers were delivered on a variety of subjects relating to utility distribution, transmission, and generation. Entire sessions were devoted to EHV transmission, capacitors, radio and television interference, and system engineering. Other sessions dealt with engineering ethics and management.

Highlights of these technical sessions will be carried in the Feb. 27 issue of Electrical World. News events of the meeting are reported in this issue (p 16).

Let's Define Capability

The essence of progress is the ability to measure and compare. Yet in the field of power generation the almost complete absence of a "standard" definition of capability that can be uniformly applied to all machines has hampered comparison of power plant unit costs and performances.

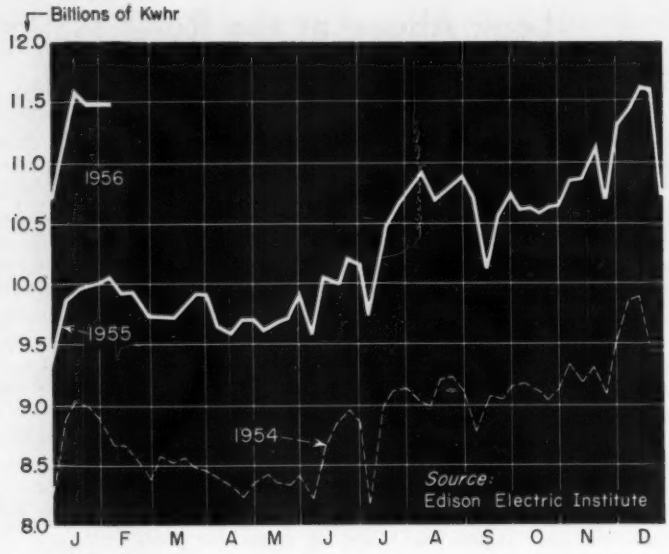
Wide, but not official, use has been made of a definition based on the manufacturer's evaluation of what the turbine is capable of producing under a given set of standard conditions. Defined as the capability of the turbine in kw when operating with designed steam conditions and exhausting at 3½ in. of mercury absolute with 3% makeup, it has been variously called "Manufacturer's Maximum Guaranteed Turbine Capability" and "Manufacturer's Maximum Rated Capability".

No vocal opposition to this basic definition has been heard. Yet it has not been officially accepted.

Operating capability can not be the answer as this depends on the extent to which an operator is willing to "push" a machine. Actually it is more an indication of system operating conditions or the boldness of the operator than it is of the guaranteed performance of a machine. This definition shouldn't be tied to the generator because of the many variables attached to its rating (e.g. power factor, short circuit ratio, and hydrogen pressure) and the practice of sometimes buying oversized generators.

On the other hand "Manufacturer's Maximum Guaranteed Turbine Capability" is precise and clear in its definition. Why then shouldn't it be swiftly adopted so that comparison of power plant unit costs and performance data can be made on a common basis.

ELECTRICAL WEEK



OUTPUT

Week Ended Feb. 4
11,540,000,000 Kwhr
Up 14.9%

Atomic Energy Commission requirements — 1,125,000,000 kwhr (Electrical World estimate). Excluding AEC, output increase was 10.4%

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Feb. 4	+14.9	+8.9	+7.1	+22.1	+10.8	+14.1	+15.0	+14.4	+21.1	+12.8
Jan. 28	+15.1	+11.0	+8.9	+22.8	+10.2	+13.1	+14.5	+10.2	+17.1	+16.3
Jan. 21	+15.4	+11.2	+9.1	+23.6	+11.2	+16.1	+13.2	+12.6	+14.9	+10.6

Seasonally Adjusted Index 215.5 Week Ago 213.5 Year Ago 187.5

Issue's Highlights—AEC's small reactor program brings seven proposals from co-ops and municipalities . . . Live Better Electrically program kicks off with closed-circuit TV show . . . AIEE holds winter general meeting in New York . . . OVEC installs last 215,000-kw unit at Clifty Creek . . . Five utilities are nominated for Coffin Award . . . Sandy, Ore., Electric Co-op considers selling system to Portland GE.

From Courts and Commissions—Lynn G&E has received Massachusetts DPU approval to increase rates $209,967 a year effective March 1 . . . Carolina P&L and other utilities are protesting proposed 7% hike in railroad freight rates. CP&L notes hike would have cost it $384,329 last year when freight bill was over $5 million, or 20.2% of total operating costs . . . New York PSC has suspended Long Island Lighting's proposed $758,500 a year electric rate increase . . . California Oregon Power has filed "friendly" suit in circuit court to clarify Oregon Commission's authority to establish depreciation rates.

Atomic Power Costs—The time and place "that atomic power becomes competitive with other power is an academic matter," Westinghouse Pres Gwilym A. Price last week told Society for Advancement of Management group in Pittsburgh. Future demands for power will be simply astronomical, and "we have no choice today other than to develop it (atomic power) as rapidly and efficiently as we can," he said.

Nebraska Hassle—Analyzing fight between rival public power groups in Nebraska over right to expand, Wall Street Journal last week detected note of concern among Nebraskans. Many fear consolidation of state's tangled public power set-up—a possible solution to present squabble—would mean "too much concentration of political and economic power," the paper reports. Others believe "that question might well have been asked years ago, before the public power people were allowed to make Nebraska their private domain."

Labor—Sangamo Electric and Selco Union-Ind have signed three-year agreement providing 8.9¢ an hour average increase. All employees returned to work last week.

NEWS OF THE INDUSTRY BRIEFLY TOLD

Washington Wire—Confidential report to U. S. Chamber of Commerce board of directors by committee of insurance and atomic industry experts indicates that $50-million ceiling set by insurance companies on atomic risks will be inadequate. Chamber's advisory committee said government should underwrite excess coverage policies.

Chairman Clinton P. Anderson (D-N.M.) of Joint Atomic Energy Committee and former chairman, W. Sterling Cole (R-N.Y.), have co-sponsored legislation to plan use of atomic energy for lighting, heating, and air-conditioning U. S. Capitol.

U. S. Army Engineers told Congress that although it might be feasible from an engineering standpoint to include power facilities in planned New England flood control dams, it would not be economic.

AEC Chairman Lewis Strauss and Sen Clinton P. Anderson have clashed again on atomic secrecy. Anderson charged AEC with trying to put "Iron Curtain around thought." Strauss maintained program is producing desirable results and "there are no specific indications" secrecy system has delayed peacetime reactor development.

House judiciary subcommittee headed by Rep Emanuel Celler (D-N.Y.) has set Feb. 28 for start of hearings on regulated industries, including electric utilities.

Atomic Power for California—AEC has authorized Southern California Edison and Atomics International, division of North American Aviation, to negotiate contract in connection with AI's experimental reactor near Santa Susana. Edison will spend about $1 million on generating equipment to utilize heat produced by the reactor. It expects to feed power from this project into its system by the summer.

Smog Study—Southern California Edison plans $250,000 for research and pilot plant equipment tests this year in effort to control smog producing vapors from oil-burning generating plants in Los Angeles. Additional $1.5 million has been budgeted by company to be used in continuing program if initial studies warrant.

Westinghouse Strike—Negotiations resumed last week with new ground rules for discussion of wages and other issues. Westinghouse had full committee present but IUE Pres Carey was missing at start. Back to work movement continued with latest tally showing 28% of IUE members back at 9 plants and 14% of UE at a 10th plant.

ABOUT PEOPLE IN THE INDUSTRY

Philip A. Fleger, chairman of Duquesne Light, last week received the award of "Outstanding leadership in the field of management" given by Duquesne University Chapter, Society for Advancement of Management. In accepting award, Fleger noted that many people think potentialities of atomic power "for good is so great that we cannot afford to speculate about it or to indulge in half measures. Shippingport is an expression of this viewpoint." The plant, he added, is expected to become a Mecca for engineers and scientists.

Financial managers are essential to growth industries in an inflated economy, according to Harold Quinton, president, Southern California Edison. Yet, he told recent AMA conference, "we see financial direction and responsibility assumed by those who have advanced to top officer positions through non-financial channels. While there is no halo around the financial officer, there is no substitute for training and experience in handling of financial tools." Flexibility in financing should also be major objective, he said.

More News About People page 38

Seven Small Reactors Proposed

- **AEC's small unit program draws greater response than big reactor program**
- **Units in 5,000-40,000-kw range are proposed by co-ops and municipalities**
- **AEC offer of aids to stimulate reactor engineering provided an incentive**

The Atomic Energy Commission's small-scale power reactor program elicited greater response from rural electric cooperatives and municipalities than AEC's earlier big reactor program received from larger utilities.

The small-plant program was designed to bring forth proposals for power reactors in the 5,000-40,000-kw class, to supplement the successful big-plant program opened a year ago. Both are part of the government's attempt to spark private development of nuclear power, with as little government subsidy as possible.

Aims of Program Outlined

When it opened the second half of its program last September, AEC announced these two aims: (1) Promotion of small reactors for areas served by cooperatives and municipalities and not easily supplied by central station plants, and (2) development of export-size reactors to meet the lower requirements of the underdeveloped foreign areas.

The program brought off the drawing boards designs for several different types of reactors, ranging from 2,000 kw upwards.

Seven Proposals Received

The smallest design application came from the University of Florida which plans a 2,000-kw pressured light water reactor, for completion in 1959.

The other six applications received by the Feb. 1 deadline were:

Chugach Electric Assn., Anchorage, Alaska, and Nuclear Development Corp of America, White Plains, N. Y.—sodium cooled, heavy water moderated reactor, 10,000 kw; completion date, mid-1961.

City of Holyoke, Mass., Gas and Electric Department—gas cooled reactor with closed cycle gas turbine, 15,000 kw, design agent, Ford Instrument Co.; no completion date indicated .

City of Orlando, Fla., liquid metal fuel reactor, 25,000-40,000 kw, design agent and completion date not indicated.

City of Piqua, Ohio—organic moderated reactor, 12,500 kw, design agent, Atomics International, North American Aviation, Inc., Downey, Calif.; completion date 1960.

Wolverine Electric Co-operative, Hersey, Mich.—aqueous homogeneous reactor, 10,000 kw, design agent, Foster Wheeler Corp., for reactor portion and Worthington Corp., Harrison, N. J., for secondary loop; completion date not indicated.

Rural Cooperative Power Association, Elk River, Minn.—boiling water heterogeneous type reactor, 22,000 kw, to be supplied by American Machine & Foundry Co (EW, Aug. 8, 1955, p 61). This proposal was rejected by AEC but has been resubmitted by the cooperative.

Unusual Designs Presented

AEC officials feel the unusual approaches embodied in several of these designs will prove more important to development of peacetime nuclear power than the sizes might indicate.

The small-scale reactor program was a highlight of the opening session of the Joint Congressional Atomic Committee, which is listening to witnesses on AEC progress under the 1954 Atomic Energy Act.

Chairman Lewis L. Strauss and Commissioners Willard F. Libby, Thomas E. Murray, and Harold Vance testified, as well as Reactor Development Division Chief W. Kenneth Davis. The fifth commissioner, John Von Neumann, was unable to attend the opening session because of illness.

Aids Offered in Program

They outlined in general terms the whole reactor program, and released the details of the small reactor program.

The aids which AEC offered under the small-scale reactor program included: (1) Waiver of established Commission charges for use of source materials and nuclear fuels for five years from issuance of an operating license; (2) use of AEC laboratories and facilities; (3) negotiated payment for technical and economic information produced in developing, designing, building, and operating the reactors accepted under the program; and (4) financing and retaining title to all or part of the power reactor system.

AEC has not yet indicated how far it will go in granting these aids to those who applied.

The seven proposals submitted under the small reactor program compares with four proposals AEC received when it invited designs for larger power reactors in the 100,000-kw class.

Large-Scale Reactors Proposed

Under the first plan, Detroit Edison Co and associates submitted blueprints for a 100,000-kw fast breeder. Also the Nuclear Power Group turned in a design for a 180,000-kw boiling water plant; Consumers Public Power District of Columbus, Neb., submitted one for a 75,000-kw sodium-graphite plant; and Yankee Electric Co one for a 100,000-kw light-water moderated and cooled reactor. The first three of these have been accepted; Yankee's is still being negotiated after having been rejected once, as was Consumers' design.

In addition, several other reactor plans were submitted without reference to AEC's aid program. Consolidated Edison Co of New York announced it was seeking a license for a 236,000-kw pressurized water reactor-superheater combination, and Pennsylvania Power & Light Co expressed its intent to build a 100,000 PWR.

Tidal Power Study Ok'd

A bill authorizing a $3-million study to determine cost and economic feasibility of harnessing Passamaquoddy Bay for development of a tidal power project has been signed by President Eisenhower. The Joint Commission on U. S.-Canadian Boundary Waters will make the study.

LBE Program Gets Rolling

- **Closed circuit TV shows sponsored by 100 electric firms**
- **Initial splash features comments by industry leaders**

"Live Better . . . Electrically," the industry's broad new residential load building program made its official debut last Wednesday.

A total of 35,000 electrical trade people, architects, builders, realtors, and bankers across the nation heard the program formally introduced via a one-hr, closed circuit television show. Presentation was sponsored by more than 100 electric utilities in 76 cities.

Master of Ceremonies John ("What's My Line") Daly and Singing Star Giselle MacKenzie interviewed a battery of industry figures who explained to the trade audiences their stake in the new program. Their statements:

Industry Leaders Comment

Harllee Branch, Jr., president of Edison Electric Institute: "If we can put across this broad concept of 'Live Better . . . Electrically' all segments of our far-flung interests will benefit economically. It will require the utmost cooperation of all of us."

Oliver F. Burnett, president, National Electrical Contractor's Association: "Home electrical modernization alone is an estimated $6¼ billion worth of contractor work. I have not the slightest doubt that the magnificent 'Live Better . . . Electrically' campaign will stimulate a most pressing demand for expanded electrical systems in the home."

Joseph B. Haverstick, president, National Association of Home Builders: "Technological improvements in the home fundamentally are powered by electricity. The difference in cost between a substantial wiring system and one that just meets minimum requirements only amounts to a few cents a day over the period of the average mortgage."

George Bain Cummings, president, American Institute of Architects: "We in the architectural profession are eager to participate. Home use of electricity is increasing all the time. The architect who insists on installing an adequate electric system becomes a better friend of his client through the life of the house."

Walter H. Dreier, president, United States Savings and Loan League: "Since the electrical living aspects of a house add considerably to its livability, and hence its value, we have no hesitation in granting loans to be used for modernization, new appliances, or other items contributing to better electrical living."

Walter S. Dayton, National Association of Real Estate Boards: "Nobody knows better than the realtor how electrical modernization will prevent the depreciation of the investment in a home."

Fischer S. Black, publisher and editor, Electrical World, summed up the benefits of the program: For utilities, greater demand for electricity; for dealers and distributors, more sales; for architects, exciting designs for modern living; for builders, better homes that are easier to sell; for the electrical contractor, more income from new home construction and renovations; for lending institutions, a more valuable home as security plus a huge market for improvement loans; for real estate brokers, more marketable housing.

Here's how some of the utilities handled last Wednesday's TV presentation:

- In St. Louis, Union Electric Co tied in the meeting with its big National Electrical Week celebration.
- In New York City, Consolidated Edison Co held a special pre-show luncheon for 350.
- In Johnson City, N. Y., New York State Electric & Gas Corp drew 400 contractors, dealers, and distributors.
- In some cities, utilities sponsored the show jointly. Others plan to present the show, via kinescope, to new audiences later on.

Now, with the closed circuit show over and trade cooperation pretty much crystallized, utilities are getting ready to tackle the program's second phase. Their next step: The consumer.

National advertising to backdrop local utility promotion will break in April with ads scheduled in nine consumer magazines plus a network television show. Among items to be made available for local use: A 27½-min color-sound motion picture, "Meet Mrs. Swenson," for club, school and civic group showings; special exhibits for display at local trade shows.

GISELLE MACKENZIE

JOHN DALY

Arizona PS Dedicates Saguaro Plant

Arizona Public Service Co recently held informal dedication ceremonies and a weekend open house at its new 200,000-kw Saguaro Plant located in southern Pinal County.

The plant (above) is a completely outdoor installation with equipment housing consisting only of walk-in enclosures over the head and exciter ends of the two turbogenerators. Control building and warehouse and service building are enclosed structures.

Provision for future installation of two more 100,000-kw units has been made in the plant design.

Red-Ruled Union Cited in Foreign Bid Rejection

Communist domination by a labor union was ruled as cause for rejection of a low Italian bid on a hydraulic turbine for the Roza Plant of the Reclamation Bureau's Yakima Project and two 2,750-kva generators for the Deer Creek Plant on the Provo River.

Contracts probably will go to:

Baldwin-Lima-Hamilton Corp, which bid $222,000 on the Roza turbine. It would be built by Baldwin's subsidiary, Pelton Water Wheel Co, San Francisco.

Elliott Co, Jeannette, Pa., which bid $145,402 on the Deer Creek generators.

Low foreign bid was $124,000 on the turbine, and $124,489 on the generators, by Stabilimenti Elettro-Meccanici Riuniti, Ansaldo, Ansaldo San Girogio, Genoa.

In rejecting the Italian bid, Interior Secretary Douglas McKay said his department acted on the advice of the State Department, which reported that the labor force of the firm is dominated by the Communist-dominated labor union CGIL. The State Department told McKay that there is no indication that significant efforts, either by management or the workers, are being made to rid the plant of Communist preponderance over the labor force.

NEWS BRIEFS

Westinghouse Electric Corp and the International Union of Electrical Workers have accepted a new government proposal for settling the strike which has lasted about four months. The new bargaining approach would temporarily set aside the time-study issue, and then attempt to settle the other major issues, including wages, length of contract, and arbitration procedures. The proposal, made by Federal Mediation and Conciliation Service Director Joseph F. Finnegan, calls for a return to work for 90 days while pursuing time-study issue.

Top-secret information on the thermonuclear process will be made available to access permit holders under a new regulation issued by the Atomic Energy Commission. Effective Feb. 4, the new rule sets forth provisions governing the entire access agreements program, under which private individuals, after a security check by the Federal Bureau of Investigation, may gain access to restricted data relating to peaceful uses of atomic energy. Access to fusion data has heretofore been reserved for government personnel.

Lowered by subnormal rainfall for five months and lack of runoff since November, the water level of Buggs Island Lake (John H. Kerr Dam reservoir) has fallen to 282.5 ft. elevation, lowest point since the dam was constructed. An Army Corps of Engineers spokesman said the lake level, nearly eight feet below normal minimum, has been maintained as high as possible by releasing the water sparingly to meet power needs.

Ground-breaking ceremonies for Cleveland Electric Illuminating Co's namesake—the modern 22-story, $17-million Illuminating Building on Cleveland's Public Square—were held recently. The 400,000-square-foot structure is scheduled for completion late in 1957. CEI will occupy five floors of the building.

New Bill Provides Aid on Highway Relocation

Utility companies are slated to get help in relocating facilities under provisions of highway bills now in Congress. Under the bill introduced by Sen Albert Gore (D-Tenn.) and passed last year by the Senate and still pending, states could pay 50% of relocation costs.

Now, under a new pay-as-you-go highway bill introduced by Rep George H. Fallon (D-Md.), states have the option of paying for relocation costs. And they will be repaid by the federal government on the same basis as state-federal money is matched for the project under construction that makes relocation necessary. This is 90-10 for the interstate system, and 50-50 on all other federal-aid projects.

Utility companies favor the Gore bill that definitely insures federal aid in relocating facilities.

Research for New Savings in Power Plant Operations

Steam purity has been advanced to such high levels by B&W equipment that new techniques in measurement have become necessary. In the laboratory, B&W research engineers have pioneered in the use of radioactive isotopes as a precision measuring device.
Re: CLEAN TURBINES

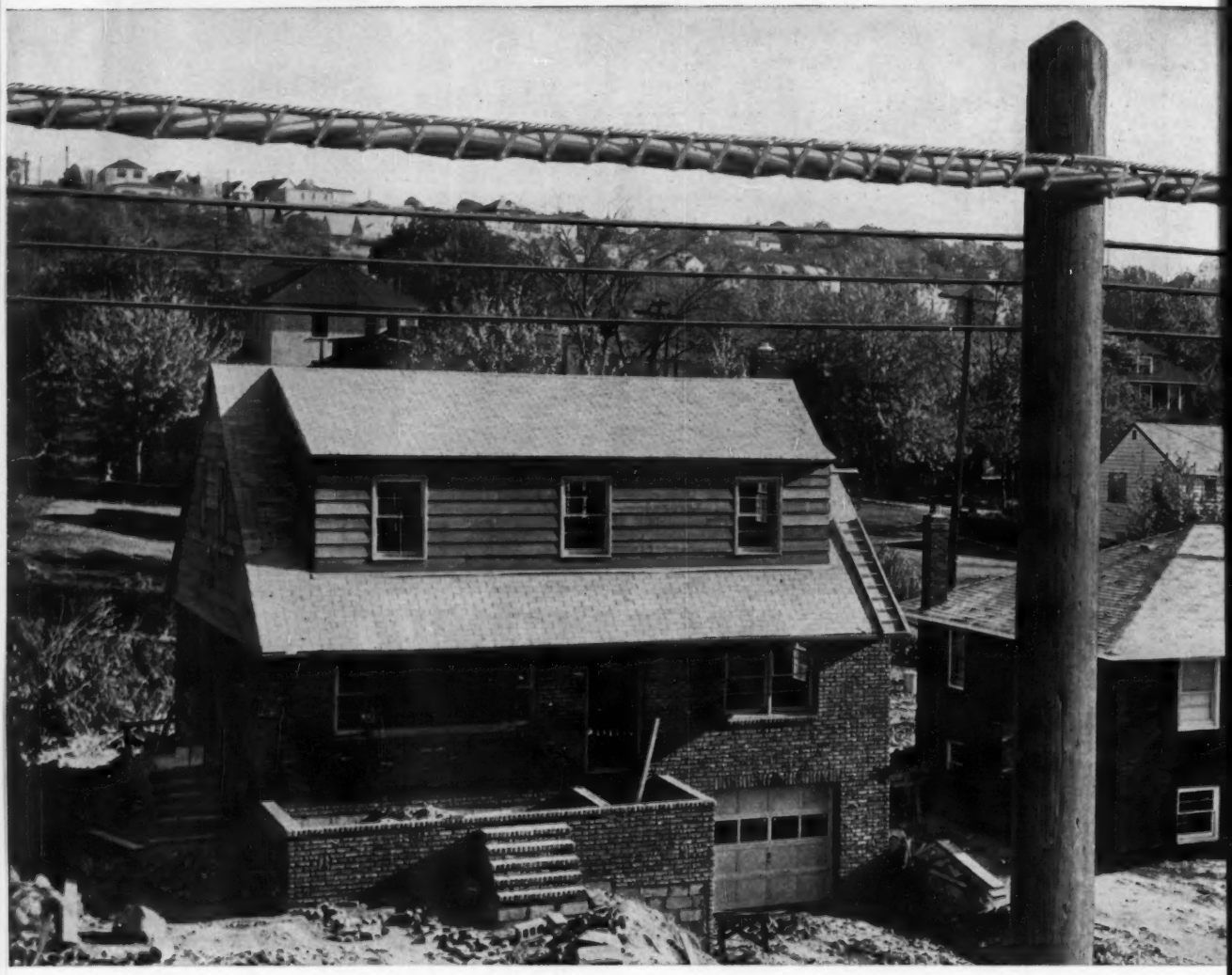
CAN TURBINE DEPOSITS BE REDUCED?

Recognizing that turbine deposits, notably silica, become more troublesome as operating pressures increase, B&W is continuing its intensive research and engineering development efforts toward further improvement in steam purity. These efforts have already produced important practical results, such as maintaining peak turbine efficiency with less frequent turbine outage for cleaning.

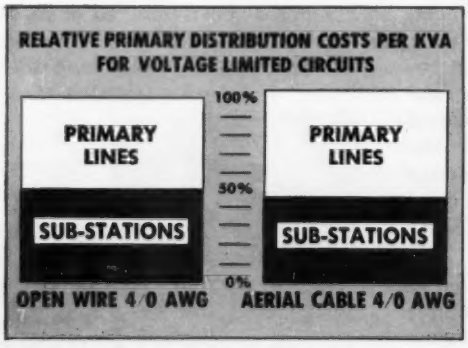
B&W Cyclone Steam Separators, steam scrubbers, and the more recently developed B&W Steam Washers—which utilize the principle of silica absorption from steam by intimate contact with condensate or feedwater—afford sound, economical answers to some of the problems of turbine deposits. Already installed in a number of important power boilers, the Steam Washer was developed after intensive B&W study of the mechanics of silica carry-over.

A discussion of "Selective Silica Carry-Over In Steam"—ASME Paper No. 55-SA-19—is available on request. Its findings are characteristic of the advanced, creative work carried on at B&W's large, fully-integrated Research Center in Alliance, Ohio. B&W's research engineers, for example, pioneered the use of radioactive isotopes for the determination of impurities carry-over. And a large part of this comprehensive research program—encompassing not only steam purity but every major obstacle to more efficient combustion and steam generation—has already been reflected in B&W's boiler designs. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

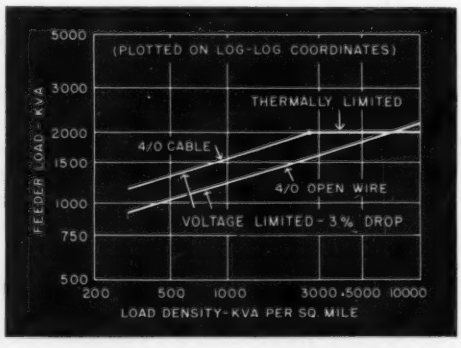
Get more load area coverage for



4/0 AERIAL CABLE vs 4/0 OPEN WIRE

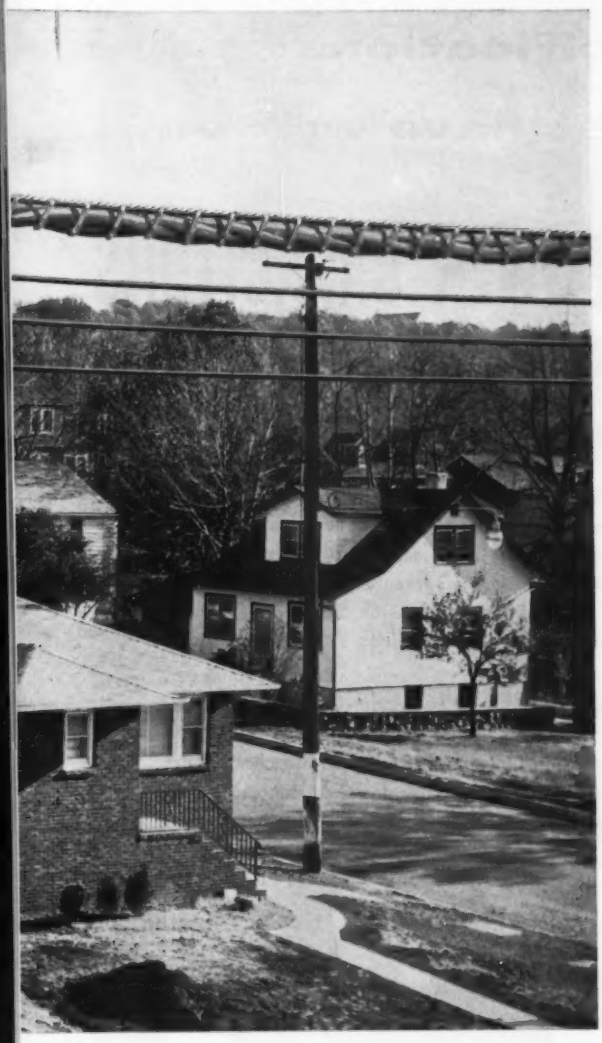


COST—Comparative primary distribution costs per kva for voltage limited circuits at 4160 volts.



FEEDER LOADING—Load density characteristics of 4160-volt feeders with 3% voltage drop limitation.

growing residential areas with G-E AERIAL CABLE



General Electric Super Coronol* aerial cable installations can help you meet increasing power demands in growing residential areas. Because of their lower reactance, these preassembled cables can carry far more load within a permissible voltage drop than open wires of the same conductor size. This means that larger areas can be covered than with open wire construction in voltage-limited distribution lines with these results:

1. Reduction in number of feeders required.
2. Use of larger substations.

Both of these advantages result in lower cost per kva of installed substation capacity.

The graphs at lower left show why the initial cost of an aerial cable installation, considered on a realistic basis of cost per kva of load (instead of cost per mile of line) is only 3 to 12% more than for open wire.

In addition, G-E aerial cable gives you:

BETTER APPEARANCE because crossarms, insulators, and unsightly open wire lines are eliminated.

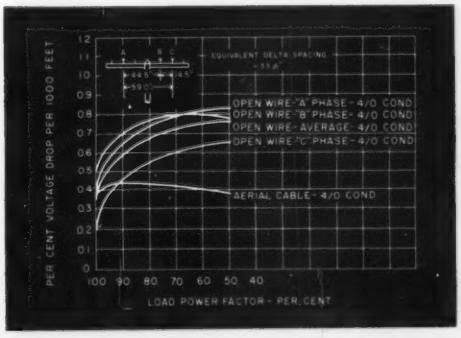
LOWER MAINTENANCE COSTS because there is less chance for storm damage, less need for tree trimming.

FEWER OUTAGE REVENUE LOSSES because messenger-supported cables are far less vulnerable to damage by weather and falling trees. Better service continuity improves customer relations.

INCREASED LOADS. Greater loads can be carried on voltage-limited 4160-volt feeders, up to a load density of 7500 kva per square mile, because of the combination of the low reactance and 85 C copper temperature of G-E Super Coronol preassembled aerial cable.

For additional facts send for a copy of "Economic Performance of Aerial Cable for Distribution Systems." Address Section W171-227, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

*Registered Trade-mark General Electric Company.


PER CENT VOLTAGE DROP PER 1000 FEET
EQUIVALENT DELTA SPACING
OPEN WIRE-"A" PHASE-4/0 COND
OPEN WIRE-"B" PHASE-4/0 COND
OPEN WIRE-AVERAGE-4/0 COND
OPEN WIRE-"C" PHASE-4/0 COND
AERIAL CABLE-4/0 COND
LOAD POWER FACTOR-PER CENT

VOLTAGE DROP—Voltage regulation per 1000 feet 4160-volt feeders, 1000 kva base, 3 phase.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Designed and built to specifications you might have written...

SANGAMO POWER CAPACITORS

Power Capacitor Specifications

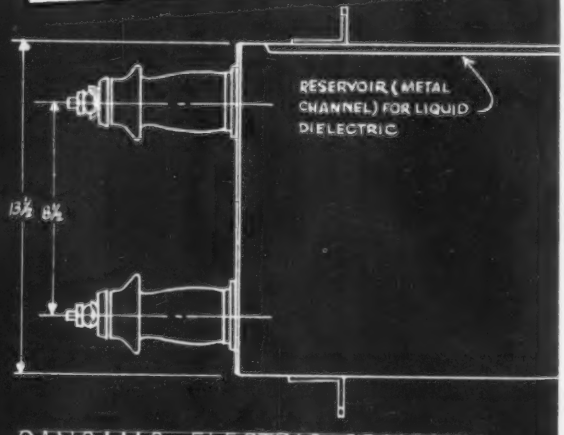
1. Corrosion protection – even though case finish is scratched.
2. Solder-sealed porcelain bushings.
3. Reliable performance at low ambient temperature.
4. Suitable for vertical or horizontal mounting.
5. Low losses.
6. Low temperature rise.
7. Stability under all operating conditions.
8. Terminal connectors for either copper or aluminum.

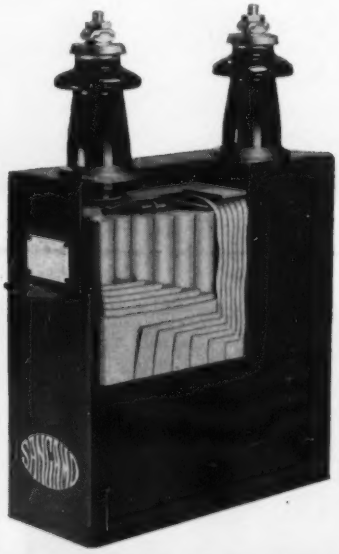
When Sangamo engineers were designing "the power engineer's capacitor", many utility men told them they wanted capacitors that could be mounted either vertically or horizontally.

Sangamo Power Capacitors can be mounted in either position. A metal channel provides a reservoir for the dielectric liquid, so when the unit is mounted with the nameplate up, full insulation to the case is retained—even in the coldest weather. If you want more details on the Sangamo Power Capacitor, write for Bulletin 1120.

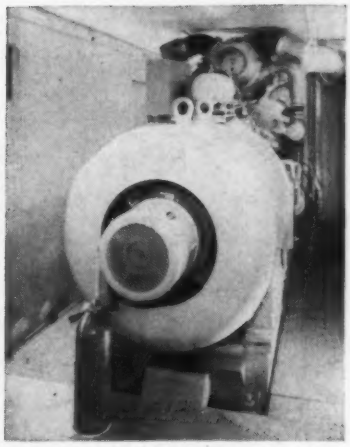
Sangamo offers a complete line of automatic capacitor controls operating on the basis of Amperes, Volts, Watts, Vars, and Time. Investigate Sangamo Lincolntrols and Time Switches for the best application of your power capacitors.

PC56-1





SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS



EXTERIOR AND INTERIOR VIEW OF TRAILER HOUSING CANADA'S LARGEST UNITS FOR HIGHWAY TRAVEL

B.C. Power Will Use 500-kw Highway Units

Two of the largest mobile generating units ever designed for highway transportation in Canada, have been purchased by British Columbia Power Corp.

The 500-kw diesel units have been put into operation at a cost of about $100,000 each. They will be used, when needed, to supplement power production at any of the 19 diesel stations operated by the B. C. Power Commission and to provide essential power in event of a breakdown or other emergency in any plant. Capacity of the generators can be upped another 100 kw by increasing the super-charge.

The 22½-ton trailers, housing the units, are 35 ft long, 8 ft wide, and 12 ft high. They are adaptable to towing either by single or tandem axle tractor trucks and can also be transported by rail.

Cost of building the units ranged about 40% higher than usual because of a triple voltage factor. The generators are re-connectable at 2,400v, 4,160v, or 12,480v, making them adaptable for use in any of the Power Commission's scattered districts.

The big diesel engine is located in the rear section of the trailer, the main generating unit in the center section, and the auxiliary diesel engine and control panels in front section (see above right). The auxiliary automatically looks after trailer lighting and heating when main unit is shut down.

Ike's Partnership Policy Scored, Defended

R. A. Tudor, Harllee Branch, C. A. Davis argue pro against Leland Olds at National Conference on Water Resources Policy

Opposition to the Eisenhower Administration's partnership policy in the development of water resources was labelled as "hard to understand" by Ralph A. Tudor, former under secretary of the Interior Department.

Tudor made his remarks at a recent meeting of the National Conference on Water Resources Policy held in St. Louis, Mo. His views were supported by Harllee Branch, president of Edison Electric Institute and of Georgia Power Co.

As one of the principal authors of the Administration's electric power program, Tudor countered an attack on federal partnership made earlier that day by Leland Olds, former chairman of the Federal Power Commission, who asserted that a recent Administration report embodying the idea means abandonment of "the whole concept of comprehensive, multipurpose river-basin programs."

Olds said, "Proposed private power company projects which will displace larger federal projects, if the Administration's present partnership plans go through, will sacrifice millions of acre-feet of potential storage, and such storage means both more flood control and more power."

Tudor, who contended that the federal government should aid in the development of water resources only to the extent that private interests are unable to do the job, was supported by Clarence A. Davis, under secretary of the Interior.

"It is not practicable, and certainly not desirable," said Davis, "for the Federal Government alone to assume responsibility for the complete development of the nation's water resources."

He added that "Such complete federal assumption of responsibility would tend to create local and regional dependence upon federal action, to destroy individual and local initiative, to destroy the effectiveness of the government of the states, and to work a profound and undesirable change in our traditional plan of government."

Davis said a new post of co-ordinator of water resources, "to be established in the executive office of the President" had been suggested by a presidential advisory committee on water resources policy, composed of three cabinet members. President Eisenhower had submitted that report to Congress, Davis said.

AIEE's Winter Meeting

Hooven Praises Electrical Strides

- 5,000 attend week-long meet in New York
- Con Ed's Fairman made honorary member
- R. L. Bright wins Alfred Noble Prize Award
- L. A. Umansky awarded Thomas Edison Medal

J. F. FAIRMAN CONGRATULATED BY M. D. HOOVEN

Today's electrical engineering accomplishments promise a chore-less tomorrow, Morris D. Hooven told more than 5,000 engineers, educators, and scientists at the New York winter meeting of the American Institute of Electrical Engineers. Conferees came from all parts of the United States and from Canada.

Hooven, AIEE president and electrical engineer of Public Service Electric & Gas Co, Newark, N. J., launched the week-long, daily sessions on communications, general applications, industry, power, science, and electronics.

The transistor, magnetic amplifiers, generators and motors already huge and certainly to be bigger, higher transmission voltages, and improving communications, Hooven said, are bringing in the all-electric tomorrow.

"Had Benjamin Franklin been born 200 years later," Hooven said, "his fertile imagination would have taken up the challenge that today's accomplishments present us. Direct conversion of the energy of nuclear fission into electrical energy would surely have been one of his concerns."

Conjuring up the American home the engineer is making possible, the AIEE president continued:

"The component parts of it—solar batteries, heat pumps, weather conditioning, skillful illumination, refrigeration and cooling devices, cleaning, entertainment, labor-saving and chore-doing equipment, and comfort-producing gadgets—all are ready for use.

"Great steel plants, huge communication centers, tremendous power stations have their control rooms where a myriad of electronic devices provide a degree of automation which relieves operating personnel of much tension and worry. Why not the home?"

"Imagine," he said, "a tiny room in your house strategically located as the nerve center of your living and just big enough to hold two people and scores of instruments and switches. Tomorrow's plan is about to be set up by the usual Adam-and-Eve team.

"Susie is to wake with sentimental chamber music. Junior must be blasted out with a stirring martial air. Aunt Maggie's window must be down at 4:30, and her coffee must approach boiling at exactly 6:45. At breakfast Susie's facsimile news must be set for fashions, Junior's for the basketball scores, Mother's for the social items. Mother's car must be warmed up at nine, the garage doors opened, and the snow off the driveway. And so on until Pop's electric blanket goes on at midnight.

"The complete program is set up on a recording tape, buttons are pushed, instruments checked, and the next day is taken care of."

R. L. BRIGHT AND M. J. KELLY

L. A. UMANSKY, C. A. ADAMS, M. D. HOOVEN

At the general session, the Alfred Noble Prize Award was conferred on R. L. Bright, Westinghouse Electric Corp, for his paper "Junction Transistors Used as Switches." The presentation was made by Enoch Needles, president of the American Society of Civil Engineers.

First prize in the communications division went to M. J. Kelly, Bell Telephone Laboratories, for "A Transatlantic Telephone Cable." Honored with Kelly were G. W. Gilman of the same company, and Sir W. Gordon Radley and R. J. Halsey, both of the Post Office of the United Kingdom.

43rd Honorary Member Named

Honorary AIEE membership was bestowed on James F. Fairman, past president of the institute and vice-president of Consolidated Edison Co, of New York. He is the 43rd honorary member to be named since the society was organized in 1884.

Keynoter was Roger M. Blough, chairman of the board, United States Steel Corp, who cited the need for more youthful recruits to the profession.

Soviet Union schools, he pointed out, graduated some 53,000 engineers, in contrast with our 20,000, in 1954, and material rewards for engineers and scientists are near the top of the Soviet system. The Soviet Union is the second largest steel producer in the world and has developed nuclear fission and progressed with the hydrogen bomb.

"Certainly we must agree that it would be foolish to underestimate the capabilities of tyranny and dictatorship for conquest and destruction," Blough continued. "Yet these comparisons do not imply that the United States, with its economy of private ownership and operation, is falling behind Russia.

"I believe that our problem of securing and training the needed engineers and scientists is already partially on its way to a proper solution, found within the tested American process of responsible persons doing their own thinking and acting in a competitive economy. Our way consists of substituting incentive for compulsion, and freedom's way is working now to produce more engineers."

Price of Engineers Rising

"As our economy needs and wants more engineers, the price of engineers is steadily rising," Blough continued. "In our free society that is the infallible test of what is most wanted and in what amounts. It is the irrevocable law of supply and demand.

"Our young people in schools and colleges need only to turn to the want ads to observe the workings of that law. There were 34 columns of opportunities in one metropolitan newspaper alone on a single day recently. And the price people are willing to pay for engineers and scientific services is going up," he said.

KEYNOTER R. M. BLOUGH

The Thomas A. Edison Medal for 1955 was awarded to Leonid A. Umansky, retired manager of engineering, Industrial Engineering Division, General Electric Co, Schenectady, N. Y. The honor was won by Umansky for his "outstanding contribution to the electrification of industry through the application of electrical machines, devices, and systems to automatic process machinery, and for his inspiration, leadership, and teaching of men in this work."

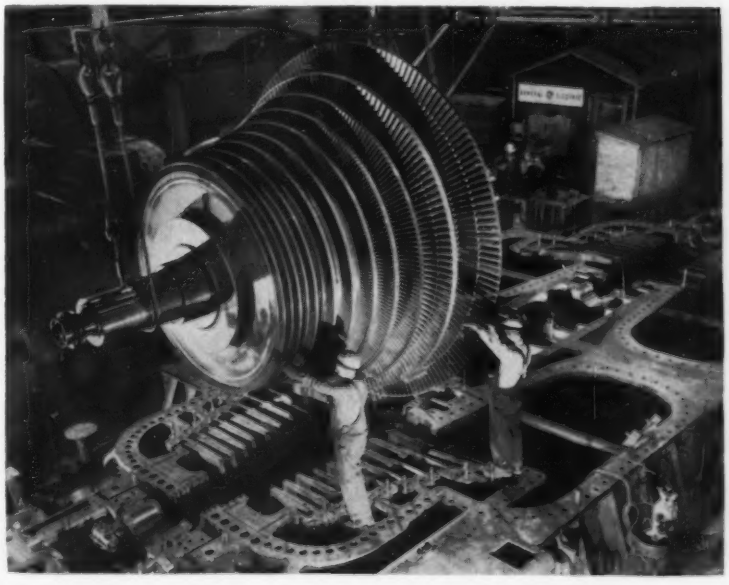
Shown with Umansky in picture (bottom right, previous page) is C. A. Adams (center), 87-year-old past president of AIEE.

OVEC Plant Installs Last 215,000-Kw Unit

Last of six 215,000-kw units to be installed at Ohio Valley Electric Corp's Clifty Creek Plant near Madison, Ind., is scheduled for initial operation this week.

The turbo-generator, shown (right) being assembled, is the last of 11 similar units installed at Clifty Creek and Kyger Creek Plants to supply Atomic Energy Commission installations in southern Ohio.

Starting of the last Clifty Creek machine marks the close of a 12-month period during which all 11 OVEC units—totalling 2,365,000 kw—were placed in operation. This is reported to be the first time that this much generating capacity has been placed in operation on a single system in a 12-month period.



5 Utilities Nominated for 1955 Coffin Award

Five electric companies have been nominated for the 1955 Charles A. Coffin Award. Each of the nominees has been asked to submit presentations for the final award to be made at the annual Edison Electric Institute convention in June at Atlantic City, N. J.

The five utilities, chosen from 36 candidates, are Alabama Power Co, Consolidated Edison Co of New York, Inc, Idaho Power Co, Ohio Valley Corp, and Washington Water Power Co. The Coffin Award, presented for outstanding achievement, consists of a gold medal and $1,000 for the winning company's employee benefit fund. All nominated companies will receive citation certificates.

Reasons for selecting the five nominees have been set down by the Coffin Award Review Committee as follows:

Alabama Power—for successful rural sales development, for foresight and success of plans gaining Congressional approval of Coosa River development, and for accomplishments in accident prevention.

Consolidated Edison of New York —for contributions to private atomic development, adequate wiring, public relations, restoration of service after severe storms, expansion of automation to accounting, and customer education.

Idaho Power—for winning Federal Power Commission approval of its Snake River projects and beginning construction immediately.

OVEC—for efficient and speedy completion of the largest single power contract yet conceived in this country and realized at OVEC's Kyger Creek and Clifty Creek Plants.

Washington Water Power — for leadership and public relations program which culminated in the utility's purchase of Stevens County PUD system with the issue having been decided by popular vote in the county which favored service by WWP.

TVA Tabs Appliances

Tennessee Valley Authority power consumers purchased about $1.5 billion worth of household electrical appliances since the end of World War II, according to survey by TVA and 151 distributors of its power.

PP&L Expands West Montana Transmission

Precipitous slopes, solid rock ledges, and the extremes of Rocky Mountain weather posed construction difficulties surmounted by Pacific Power & Light Co to increase transmission facilities in western Montana.

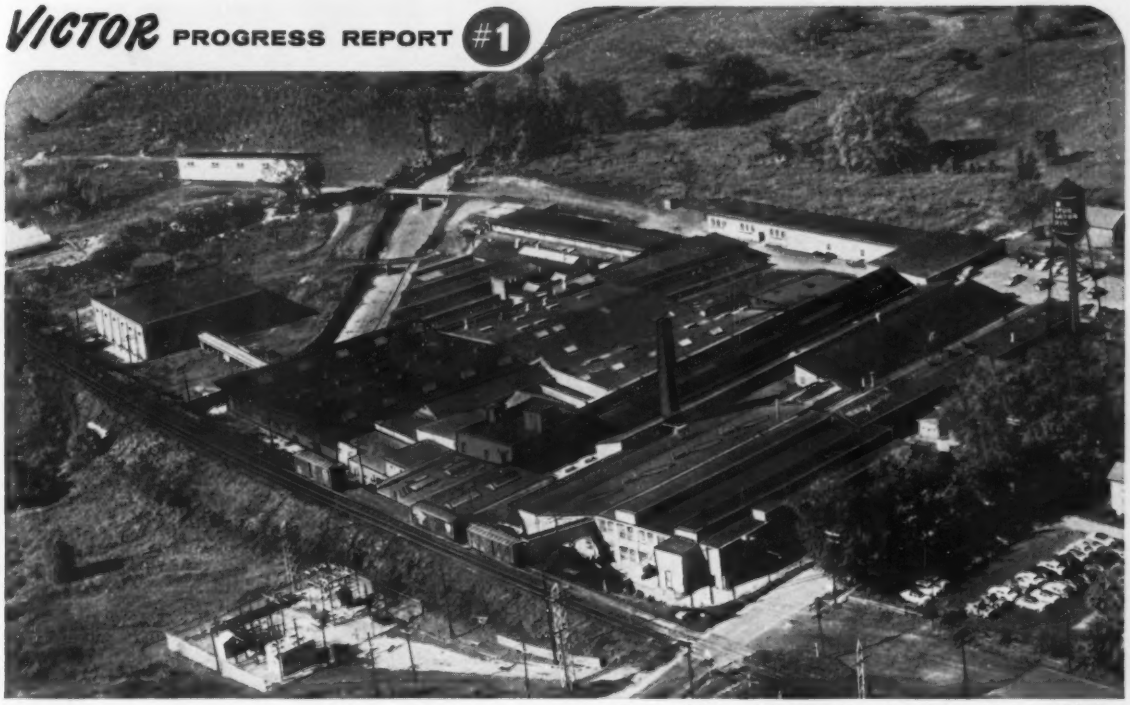
The project, costing more than $500,000, is the largest of the current $1,196,500 program for the company's facilities in that state. The Montana transmission work included $280,000 for 18-mile line between Troy and Libby and $132,500 for Libby substation.

Montana District Manager Merl Ebbe noted that the new line ties Libby into the Pacific Northwest intercompany and interagency power pools through interconnection with Bonneville Power Administration's substation at Troy.

Construction, aside from rugged terrain along the Kootenai River Valley (see photo), involved complicated highway, rail, and river crossings through a narrow gorge where an existing power line takes up most of the working space.

H-frame towers required extra guy wires as brace against winter winds and many of the holes had to be shot with dynamite in solid rock. Heavy machinery and loaded trucks were winched up steep slopes to deliver materials.

VICTOR PROGRESS REPORT #1



Portion of Victor plant outlined in red has been added since 1948.

VICTOR expands plant area 20%

TO MEET INCREASED INSULATOR DEMAND

"BETTER INSULATORS THROUGH RESEARCH"

Sixty-three years ago the manufacture of wet process porcelain insulators began at VICTOR. Since then, the plant facilities at VICTOR have had to expand continually to meet increased demand. In fact, during the last seven years alone, VICTOR has had to enlarge its plant area 20% to provide greater facilities for switch and bus insulator, bushing and special porcelain manufacture, raw material storage, for new ceramic and electrical laboratories and in-plant loading docks. VICTOR'S modern plant, engineering and research facilities are unsurpassed in the industry! You just can't buy better insulators!

SPECIFY VICTOR

Purified Porcelain Insulators!

I-T-E

VICTOR INSULATORS DIVISION
I-T-E CIRCUIT BREAKER CO.
VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains
Spools • Switch and Bus Insulators • Custom Designed Porcelain
Insulator Hardware

Why you should use G&W POTHEADS

on rubber insulated, shielded, neoprene jacketed 15 Kv. cables

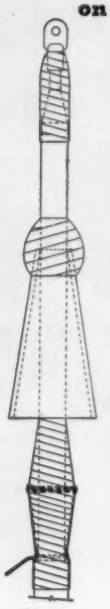


Fig. 1—
Cable termination.

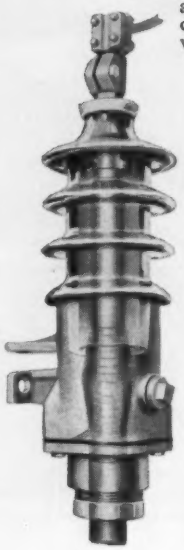
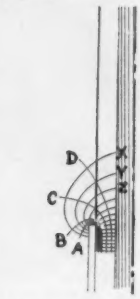


Fig. 2—
15 Kv. Pothead

Increasing the creepage length on a cable in air beyond a certain distance increases the flashover very little—because ionization of the air (corona) begins at the grounded shielding terminus at the same potential (for a given cable) regardless of the length.



Equipotential lines—
A—B—C—D
Flux lines—
X—Y—Z

Fig. 4—Without stress relief cone. High electrical stresses at grounded shielding may cause insulation failure.

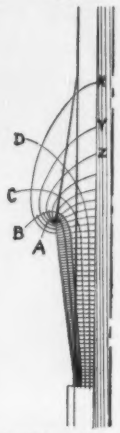


Fig. 5—Stress relief cone decreases radial electrical stresses in the cable' insulation but has little influence on longitudinal stresses.

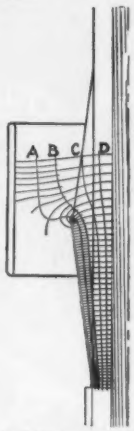


Fig. 6—Further decrease in concentration of flux lines and increase in electrical strength is provided by proper location of grounded pothead body.

A. Exposed insulation surfaces become coated with contaminating dust and in coastal zones salt condensation – which become conducting when wet. As the conducting surface dries unevenly, excessive voltage gradients develop over small areas – arcing can occur and carbonize the organic insulation of a cable termination and result in dielectric breakdown. Inorganic porcelain as used in a pothead is not so affected.

B. The principal benefit of the stress relief cone is in the improved strength of the installation due to an increased resistance to puncture of cable insulation at the grounded shielding terminus where the stress is greatest.

C. Cable surface flashover is increased by the use of insulating compound which has a high dielectric strength compared to air. A pothead provides a container for compound and the compound permits a considerable reduction in the length of the installation.

D. The pothead porcelain provides an outer surface of relatively large diameter compared with the cable, thus reducing the external voltage stresses.

E. High external creepage distance for a given length of porcelain is provided by petticoats which improve the wet flashover characteristics.

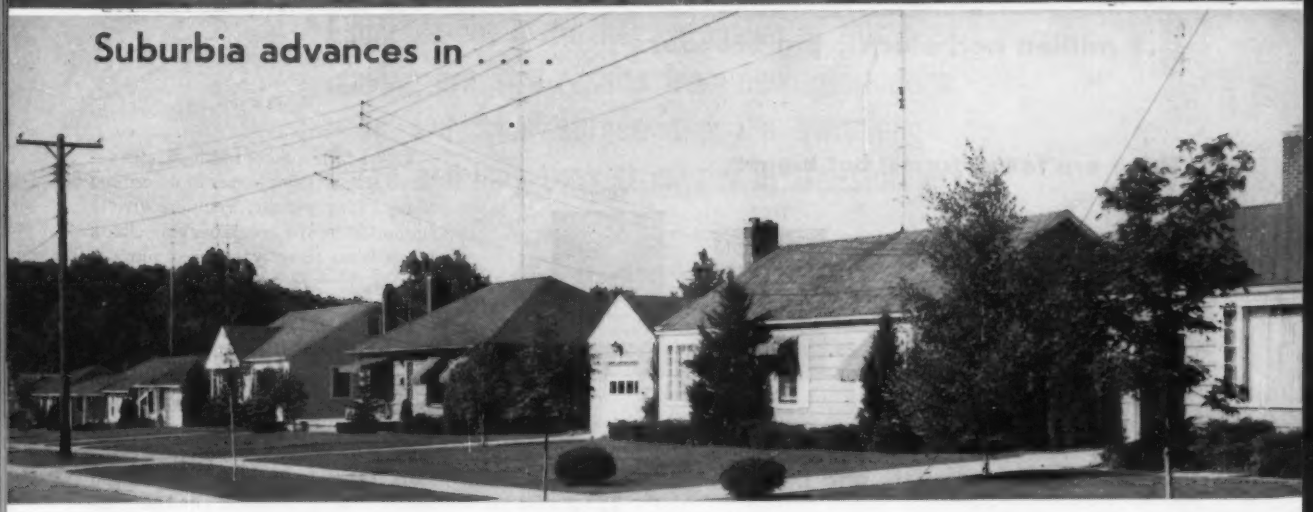
F. Potheads (porcelain insulated, compound filled, hermetically sealed) properly protect cable ends against the contaminating effects of weather. G&W potheads meet established A. I. E. E. standards of 60 cycle and impulse voltage withstand values. The extra cost of a pothead (fig. 2) over the cost of materials required for a cable termination (fig. 1) is relatively small – compared with direct and intangible losses resulting from service interruptions due to failures of improperly protected cable ends.

Send for Pub. AP55 on CABLE TERMINATING

G&W ELECTRIC SPECIALTY CO.
7780 Dante Avenue, Chicago 19, Illinois, U.S.A.
Representatives in principal cities of U.S.A.
Canadian Mfr.—Powerlite Devices, Ltd., Toronto, Montreal & Vancouver

Send for Bul. AB-D—Pothead Installation Instructions.

A561



The Changing Rural Market

Climbing farm and non-farm power use, greater use of mechanization on the farm, rapidly growing non-farm population — all are elements in this look ahead to 1965

By 1965 rural area customers, farm and non-farm combined, will be buying 2½ times as much electricity as today. Farm customers, about the same in number as today, will be using twice as much electricity. Non-farm customers, members of advancing suburbia, will grow both in numbers and in average kilowatt hour use.

Despite the scare headlines and the pitched political battles over declining farm income and declining farm population, the rural power market will remain among the brightest on the horizon.

This outlook is based on authoritative Department of Agriculture surveys and developed in this special Electrical World report. On the following pages the major elements in this changing rural market are graphically presented.

Highlights of the Changing Rural Market

More farms electrified despite decline in number of farms. Greater mechanization indicated . . . . . p. 22

Appliances, equipment to add 18.8 billion kwhr load by 1965 . . . . . p. 25

But rural power growth will vary region to region . . . . p. 27

Total rural power sales will move toward 125 billion kwhr in 1965 . . . . . p. 30

And will require shifts in distribution practices . . . . . p. 32

The Changing Rural Market . . .

Means Larger Farms, Bigger Customers

Of the 4.4 million electrified farms in 1954

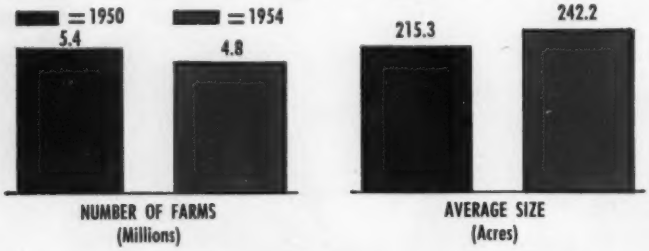
2.8 million had piped running water

1.7 million had TV sets

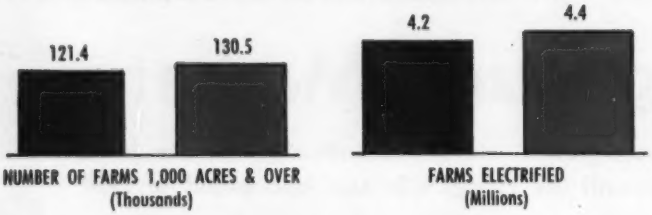
.7 million had power feed grinders

.1 million had electric pig brooders

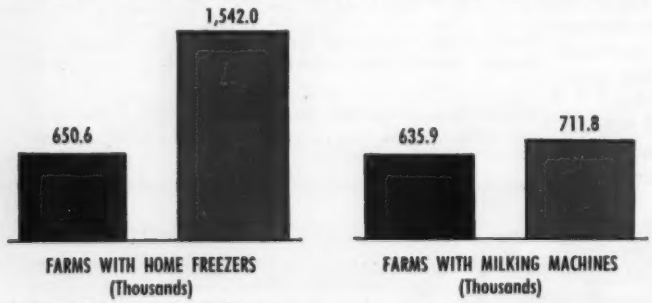
There are fewer farms, but bigger . . .



. . . more of giant size, and more electrified



Home freezers gain, along with milking machines



SOURCE: 1954 Census of Agriculture

Fewer farms, more mechanization—those are the key phrases in describing today's farm picture. They are vividly supported by the accompanying charts taken from recently released summaries of the 1954 Census of Agriculture.

From 1950 to 1954 the number of farms declined by 600,000, or 11.1%. This decline was evident in every state except Florida and in all except 180 out of the 3,067 counties in the United States. Most of the decrease was registered in farms of from 10 to 100 acres, which declined 449,000 or 17.8%. During this same period the number of farms 500 to 999 acres has increased 5.1% and the number of farms 1,000 acres and over has increased 7.5%.

At the same time farm mechanization has made rapid gains. More than one million tractors were added, and 350,000 farms got tractors for the first time. Electricity was brought to 200,000 more farms during the five-year period enabling operators and their wives to make use of numerous electrical devices in their farm and home tasks.

For utilities, mainly electric companies and cooperatives, this has meant more customers, higher demands, greater power sales. Farm use of electricity has gained as kwhrs have moved in to replace the hired hand and enable operators to farm larger acreages with less manpower.

General Electric now ready to furnish HIGH-VOLTAGE POWER TRANSFORMERS INSULATED TWO STEPS BELOW "FULL B.I.L."

... with no sacrifice in reliability

Endorsement of further extension of this cost-saving practice results from new information on switching surges and the switching-surge and long-time strengths of transformers

The amount of insulation in a transformer is one of the principal things that determines its cost. That's why *all* domestic utilities purchasing 230,000-volt and 330,000-volt transformers in the past several years—and *many* buyers of units for lower voltages—have specified that their transformers should be insulated at 1 or 1½ steps BELOW the "Full B.I.L." corresponding to the voltage of their system.

Still further reductions in insulation level were economically attractive, and to obtain actual experience, General Electric in 1951 and 1952 shipped 12 large power transformers for 138,000-volt and 230,000-volt systems with insulation levels reduced two classes. With modern G-E lightning arresters, lightning and impulse voltages were no longer problems, but we felt it desirable before proceeding on a general basis, to extend our knowledge of switching surges, and switching-surge and long-time strengths of transformers.

New information has now been obtained from the test and research facilities of the G-E High Voltage Laboratory at Pittsfield, Mass., and the pioneer transformers placed in service four and five years ago have been operating entirely successfully.

GENERAL ELECTRIC NOW OFFERS POWER TRANSFORMERS INSULATED "TWO STEPS DOWN" . . . WHEN PROTECTED WITH THE LATEST G-E LIGHTNING ARRESTERS . . . AND WITH NO SACRIFICE IN RELIABILITY.

Going from Full B.I.L. to 1½ steps down saves the purchaser about 25% in first cost. The added ½ step saves approximately 10% more. For example, in a single substation now being considered, a saving of $160,000 will be realized. Conservative estimates indicate that the utility industry will purchase 30,000,000 kva of power transformers, 230,000 volts and higher, during the next 5 years. If these units are 2 steps down instead of 1½, utilities will save about $15,000,000 in first cost alone.

System planning, designing, and operating engineers will also welcome the accompanying reductions in losses, impedances, weights, and dimensions. A word to your G.E. Sales Engineer and his Transformer Specialist will bring you more specific information on what "two steps down" can mean to your next high-voltage power transformers. General Electric Company, Schenectady, N. Y. 421-47

Progress Is Our Most Important Product

GENERAL ELECTRIC

Mr. C. J. Cox (at right, above) supervises the installation of Okonite Splicing Tape on 2300 volt motor lead in Seabrook Farms food freezing plant. For 29 years Mr. Cox has standardized on Okonite splicing materials to assure water-tight seals on cables throughout the plant. Note moisture conditions indicated by frozen condensation on pump head.

Okonite Tapes resist moisture, freezing...

keep world's largest food freezing plant operating

For 29 years, Mr. C. J. Cox, supervisor of all construction and engineering for Seabrook Farms Co., has depended on Okonite Tapes to maintain the vast electrical network that keeps the world's largest food freezing plant operating. All electrical circuits (totaling 20,000 h.p. connected load), lights, as well as power for the motors and pumps which provide continuous freezing and storage capacity, are spliced and terminated with waterproof Okonite Tapes to assure positive protection against the moisture always present in the plant.

In every phase of Seabrook's operation, moisture is a problem. Treatment of food, freezing, processing, storing . . . all are damp operations with continuous condensation on cables and equipment alike. Low temperatures of the freezing and holding rooms make splicing difficult.

Okonite Tapes offer effective waterproof splices that are not affected by dampness or low temperatures. Both Okonite Rubber Tape and Okolite High Voltage Tape fuse into a solid self-vulcanizing wall of tough, waterproof insulation. Protected by Manson Friction Tape, splices maintain their moisture resistance through many years of exposure to condensation and freezing temperatures.

Try them on your own splices—write for this free box of 4 sample tapes to The Okonite Company, EW Tape Department, Passaic, N. J.

OKONITE splicing materials

3521

The Changing Rural Market . . .

Brings This Outlook for Sales

Projected farm appliance and equipment sales will increase annual consumption by 18.8 billion kwhr in 1965. Lighting market has greatest potential

The table below is a preview of the farm power market in 1960 and 1965. It shows the expected increases in annual consumption of electricity for those years over 1955. On an item-by-item basis it is also a forecast of the farm market for initial purchases of appliances and equipment during the five year periods. However, it does not show purchases to be made which will replace similar devices presently in use.

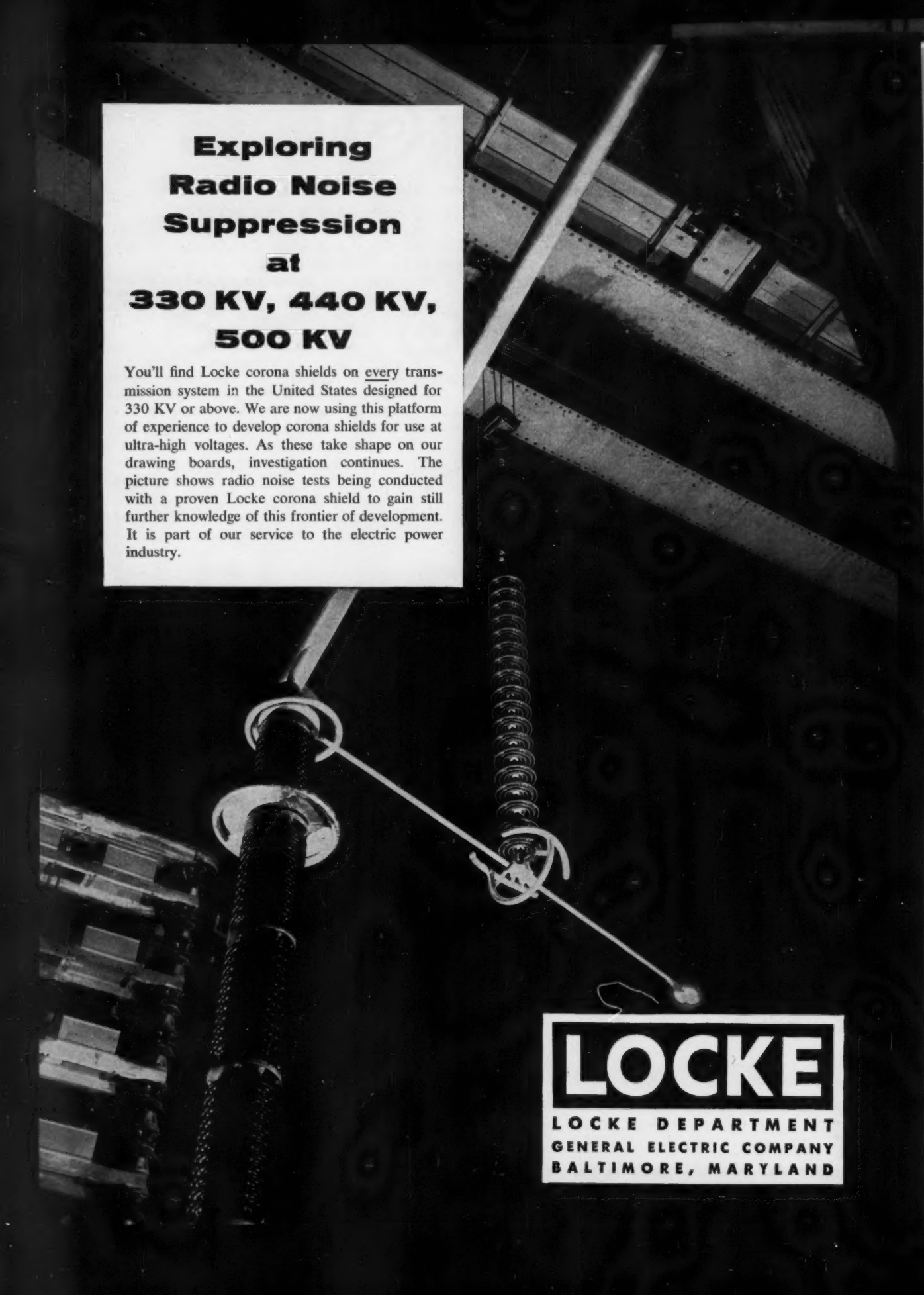
Rural Electrification Administration estimates farm purchases of electrical equipment and appliances, wiring and lighting devices over the next twenty years will total $24 billion. Add the replacement, wiring and lighting purchases to the initial purchase figures below and they reach $5.3 billion by 1960 and $11.3 billion by 1965.

Lighting and wiring devices are expected to be the best sellers, accounting for better than $2 billion in the next ten years. The added lighting load alone would account for 9.8 billion kwhr in the 1956 total.

Impressive as the projected increases below may be, they are actually conservative. The load increases are based on appliance and equipment kwhr consumption as it stands today. It does not take into account replacements which will consume more power, such as the color television sets that will replace black-and-white sets.

	Cost Per Unit $	Annual Kwhr Used Per Unit	1955-60 Initial Purchases $ Millions	1955-60 No. of Units	1955-60 Increased Kwhr (Millions)	1960-65 Initial Purchases ($ Millions)	1960-65 No. of Units	1960-65 Increased Kwhr (Millions)
Farm Appliances								
Air Conditioners	340	980	81	238,235	234	79	232,353	228
Dishwashers	300	310	37	123,333	38	36	120,000	37
Dryers, Clothes	223	691	55	246,636	171	54	242,152	167
Heating, Primary	200	12,000	17	85,000	1,020	17	85,000	1,020
Heating, Supplemental	19	100	3	157,894	16	3	157,894	16
Home Freezers	395	752	144	364,556	274	142	359,493	270
Irons	11	129	...	.....	....	...	.....	...
Ranges	261	1,192	42	160,919	192	41	157,088	188
Television Sets	238	297	156	655,462	194	154	647,058	192
Vacuum Cleaners	92	29	20	217,391	6	20	217,391	6
Water Heaters	130	3,576	21	161,538	576	21	161,538	576
Water Pumps	155	184	26	167,742	31	26	167,742	31
TOTAL			602		2,752	593		2,731
Farm Equipment								
Brooders, Chick	30	72	4	133,333	10	4	133,333	10
Drill Presses	65	12	18	276,923	3	18	276,923	3
Feed Grinders	150	250	5	33,333	8	5	33,333	8
Livestock Watering	100	180	8	80,000	14	8	80,000	14
Milk Coolers	400	1,640	27	67,500	111	27	67,500	111
Milking Machines	300	400	23	76,667	31	23	76,667	31
Motors, Fractional H.P.	23	15	12	521,739	8	12	521,739	8
Power Saws	63	12	12	190,476	2	11	174,603	2
Tool Grinders	21	25	7	333,333	1	7	333,333	1
Water Heaters, Dairy	75	2,000	8	106,666	214	8	106,666	214
TOTAL			124		404	123		404
Other Appliances and Equipment*	50	145	449	8,980,000	1,300	449	8,980,000	1,300
Lighting**					4,940			4,940
GRAND TOTAL			1,175		9,396	1,165		9,375

SOURCE: Developed from data contained in studies by the Department of Agriculture and Edison Electric Institute.
* Average cost per unit and annual kwhr use estimated by Electrical World
** Increase in farm lighting estimated by Electrical World from Agriculture Department studies.



Exploring Radio Noise Suppression at 330 KV, 440 KV, 500 KV

You'll find Locke corona shields on every transmission system in the United States designed for 330 KV or above. We are now using this platform of experience to develop corona shields for use at ultra-high voltages. As these take shape on our drawing boards, investigation continues. The picture shows radio noise tests being conducted with a proven Locke corona shield to gain still further knowledge of this frontier of development. It is part of our service to the electric power industry.

LOCKE

LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND

The Changing Rural Market . . .

Will Vary Region to Region

Source: Rural Electrification Administration

• Largest farm power use will be in West where irrigation is a big factor

• Few utilities expect a decline in the number of their farm customers

• Utilities questioned see average maximum demand for non-farm customers rising between 40 and 100% in decade

Take soundings from utilities across the country and you come up with a broad range of forecasts for the future rural power market. As background for this study Electrical World queried 15 utilities scattered throughout the nation.

In general the replies supported studies made by the Department of Agriculture as to future power demands in the rural areas, but projected increase of farm power sales varied from 0.0% by a large Pacific Coast utility to 130% by a Midwest cooperative. The table at right indicates region to region variations in forecasts by individual utilities.

Chart above, based on Rural Electrification Administration estimates, shows variations from state to state as well as region to region. Note that highest average use will generally be in western states where irrigation is a big factor. Biggest average user in 1965 will be in Nevada where co-op customers will be buying an estimated 1,300 kwhr per month.

Some Individual Utility Forecasts

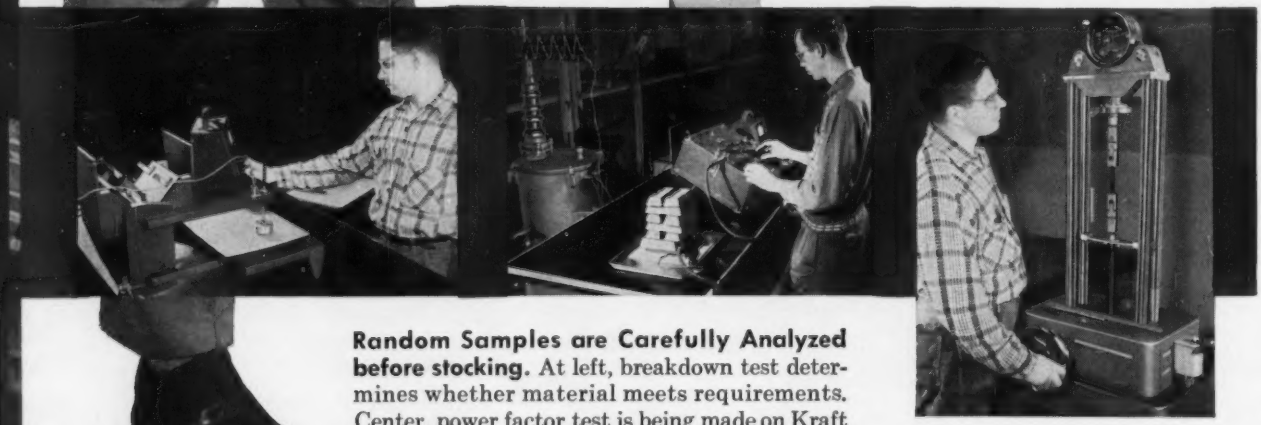
Changes From 1955-1965

Regional Location		Farm	Non Farm
Pacific Coast	Avg. Max. Demand	0.0%	+ 42.9%
	Avg. Kwhr Sales	0.0%	+ 42.9%
	Rural Customers	+ 33.1%	+ 34.9%
Pacific Northwest	Avg. Max. Demand	+ 33.3%	+ 40.0%
	Avg. Kwhr Sales	+ 38.3%	+ 50.0%
	Rural Customers	+ 14.3%	+ 60.0%
South	Avg. Max. Demand	+100.0%	+ 79.5%
	Avg. Kwhr Sales	+104.9%	+ 67.9%
	Rural Customers	+ 1.6%	+ 44.8%
Midwest	Avg. Max. Demand	+ 71.4%	+ 50.0%
	Avg. Kwhr Sales	+100.0%	+100.0%
	Rural Customers	— 15.6%	+ 34.2%

Suppliers Check...But Allis- to Assure

ALLIS-CHALMERS
POWER
Transformers

Suppliers Meet Rigid Specifications which are set by Allis-Chalmers engineers and checked by personal visits to supplier plants. Even so, additional tests are made when insulating material arrives at an A-C transformer plant. It is first checked visually and checked with micrometer to make sure exact dimensional requirements have been met.



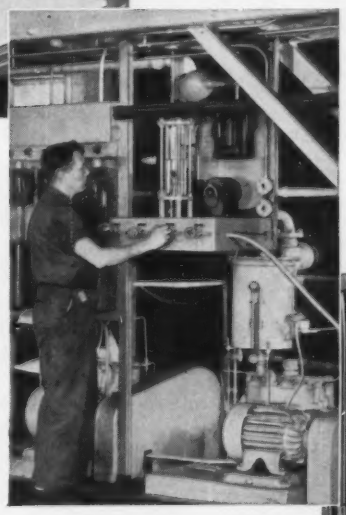
Random Samples are Carefully Analyzed before stocking. At left, breakdown test determines whether material meets requirements. Center, power factor test is being made on Kraft paper. Other tests include tests for aging, flexibility, and oil proofness. At right, an insulating rod is being checked for tensile strength before the shipment is sent to stock. If all or part of a shipment fails to meet any of these tests, it may be returned to the supplier immediately.

For information on these or other Allis-Chalmers double-checks for transformer quality, call the A-C office nearest you or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4763

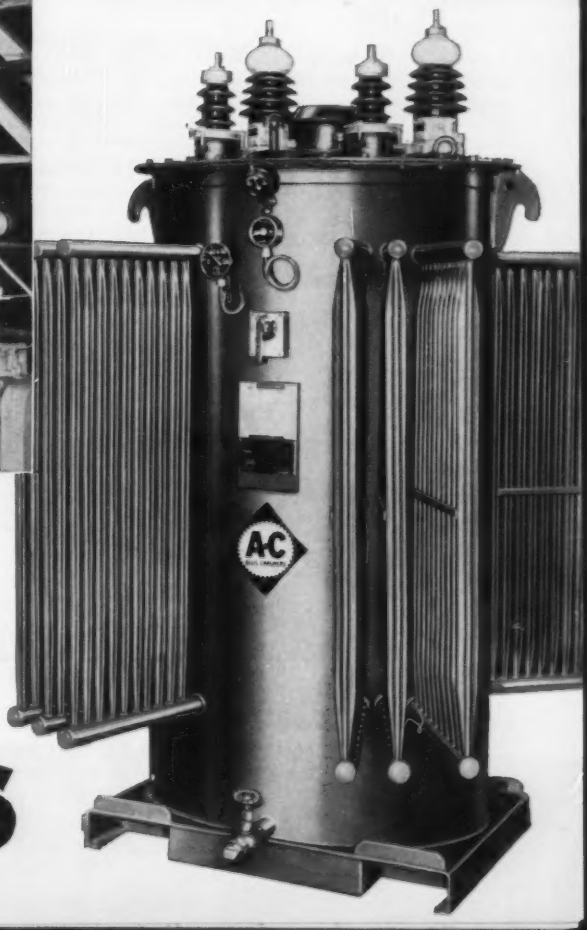
ALLIS-

Chalmers Double Checks Insulation Quality

Utmost Dielectric Strength is Assured through use of degassed oil. Above, power factor test is made after transformer is tanked. Finally, below, completed transformer is given standard NEMA and ASA dielectric tests.



Tests Continue During Manufacture. Above: Insulation resistance tests are made on windings in oven before assembly is begun. After assembly, before it is immersed in oil, further resistance and power factor tests are made.



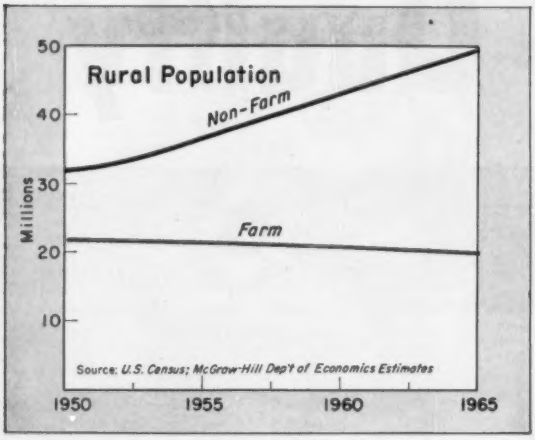
Oil is Degassed to secure thorough impregnation of insulation in special degassing equipment shown above. Oil is heated, sprayed into a vacuum chamber by high pressure jets which atomize it. Air dissolved in oil is then removed by low vacuum.

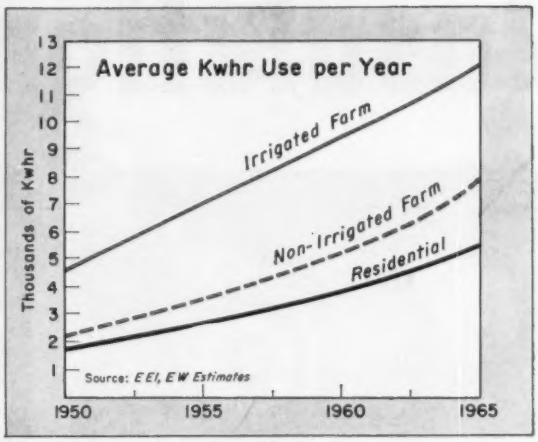
A-C ALLIS-CHALMERS

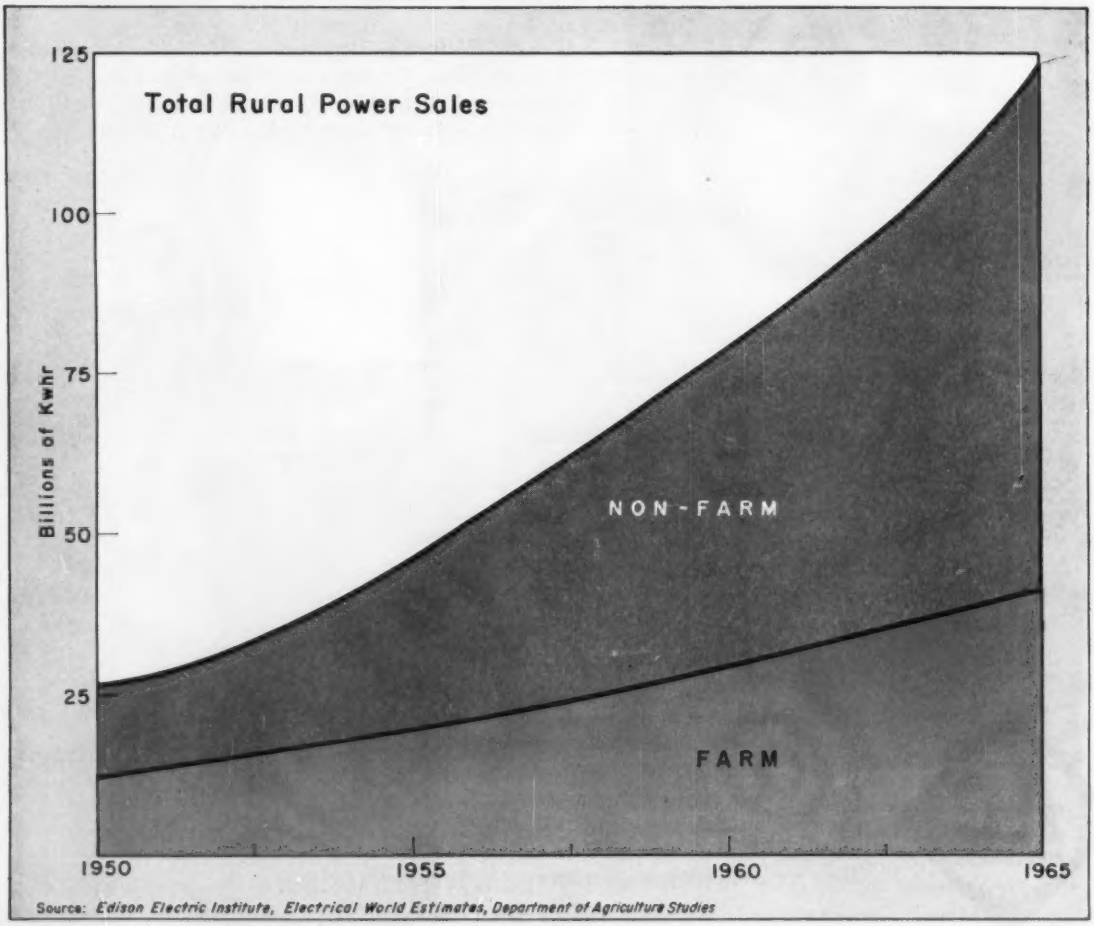
CHALMERS

The Changing Rural Market . . .

Moves Toward These Demands







RURAL POWER SALES will climb to 2½ times todays totals, farm power sales will double in the decade ahead. Underlying factors in this study are indicated in charts above. Non-farm rural population climbs while farm population declines. But all customers will be using larger amounts of power, pushing total rural sales toward the 125 billion kwhr mark

Wagner®
TRANSFORMERS
... the choice of leaders in industry

Now... Wagner Form W Transformers are up to 17% lighter... 18% Shorter

OFF WITH THE OLD . . . ON WITH THE NEW

The Form W transformer being hoisted off the line is one of the last of thousands like it which are giving dependable service on hundreds of distribution systems. The new design Form W transformers, shown at the left, are built to give the same dependable service, with the added advantage of being substantially smaller and lighter.

Even before the newest trend to lighter, shorter transformers, Wagner's famous Form W construction made it possible for Wagner to build small-size, light-weight distribution transformers. Now, Wagner engineers have redesigned Form W transformers in ratings 15 through 167 Kva, 15 KV and below, with improvements in core and coil construction that make possible reductions up to 17% in weight and 18% in the important overall height dimension.

For example, the old design 50 Kva transformer shown at the left weighs 895 pounds and measures 45 inches in height; the new 50 Kva transformers, also shown, are 145 pounds lighter and 5 inches shorter.

When you specify these new Wagner transformers, you can save money by putting greater transformer capacity on your existing structures. All ratings through 167 Kva can be pole mounted.

IMPROVED INSULATION ... A special resin coated insulating material is used for layer, channel and barrier insulation.

After heat treating, the resin varnish bonds the coil conductors and insulation together to give the coils exceptionally high mechanical and electrical strength.

MECHANICAL FEATURES In the 25, 37½ and 50 Kva ratings, cooling fins increase the radiating surface. The 75, 100 and 167 Kva ratings are provided with tubes.

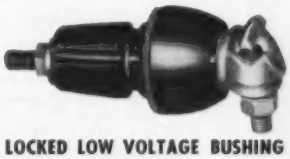
The rating of each of these new transformers is clearly shown on the tank.

There are fewer sharp edges and brackets on the tank where rust can start ... lifting lugs are curved and rounded.

These new, lighter, shorter Wagner Form W transformers will meet *your* requirements. Full details are yours in Bulletin TU-180.

HIGH VOLTAGE SIDEWALL BUSHING

For use with either copper or aluminum conductor ... safety-designed for faster, easier connections, without tools. Porcelain and terminal are locked in position.



LOCKED LOW VOLTAGE BUSHING

The bushing and terminal are key-locked to prevent rotation ... on loose terminal connections to cause internal shorts. Suitable for copper or aluminum conductor.

SHUR-SEAL CLAMPING RING

Keeps transformers sealed air-tight ... no atmospheric moisture or dust particles can get inside.

INHIBITED OIL—**reduces oxidation to a minimum ... retards formation of acids and sludge.**

Wagner Electric Corporation
EST. 1891

Wagner Electric Corporation 6456 Plymouth Ave., St. Louis 14, Mo., U.S.A.
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BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

The Changing Rural Market . . .

Requires Shifts in Distribution Practices

- **Key to trends in rural distribution is higher primary voltage. Almost 60% of utilities queried see greater use of 12 kv for future loads**
- **Trend is toward use of larger transformers—up from the 10 and 15-kva sizes which predominate in rural areas today. Smaller sizes are losing out**

To serve larger farm loads and the constantly expanding non-farm rural loads, utilities anticipate numerous changes in distribution practice. Clearly definable trends in this field are toward more use of higher primary voltages; more voltage correction devices; larger distribution transformers, more of them self-protecting; and boosts in service wire sizes.

Key to trends for rural distribution within the next decade is general acceptance of higher primary voltage. Of the 107 utilities reporting in Electrical World's 1954 distribution trends survey, some 59% saw greater use of 12 to 13 kv for meeting future loads—about twice the percentage using those voltages in 1954. Rural electric cooperatives have relied almost entirely on 12 kv since their beginning and now occasionally consider 24.9 kv for special applications.

Supplementary regulation out on the circuit is rapidly gaining support for rural areas. Trend toward use of primary capacitors is indicated for 61% of the circuits, compared with 51% in 1954. Most of this gain comes in switched capacitors. Time control represented the preferred method of 12% of the utilities in 1954 with this preference increasing to 18% in future years. Second choice is voltage control up to 14% from 12% in 1954. Current control was third choice at 5% in 1954.

Secondary capacitors likewise show an upward trend to 8% of all circuits from 4.6% in 1954. But unlike the primary capacitors, their popularity is greatest in the southern states. And use in rural areas may remain rare.

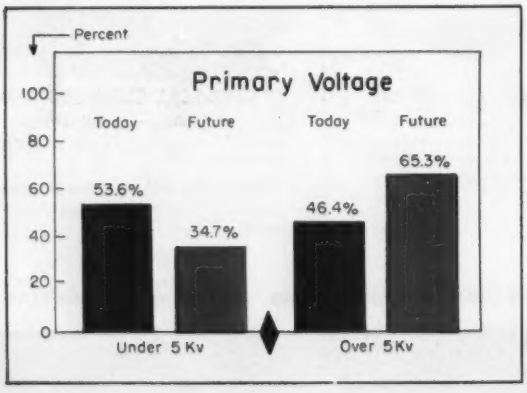
Pole-mounted voltage regulators show little gain over their 13% preference in 1954. It is a fair bet that some of these regulators will be used in combination with capacitors to get inherent advantages of both.

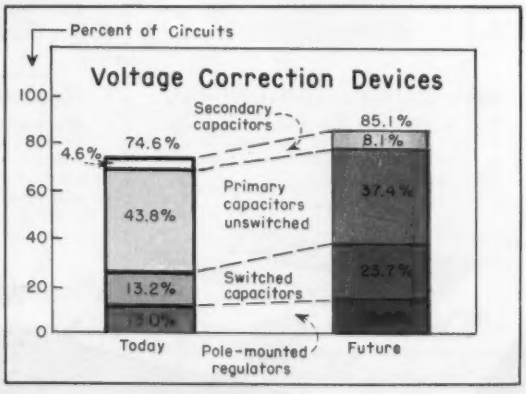
Most commonly ordered distribution transformer is 15 kva, the 1954 survey showed. There is a trend toward increasing use of the 25-kva size. In predominately rural areas, companies are buying 10 kva and larger with the trend toward higher ratings. Need for small size distribution transformers is largely met by returns from service.

Self-protecting transformers are coming in greater numbers. Some 54% of the utilities serving the growth areas indicate either present or future acceptance—up from the present 48%. Loading practice for at least one utility was designated as "CSP tripping."

Load indicating devices for conventional transformers are increasing in popularity. This combination was the choice of 4% of the utilities in 1954 and will be the choice of 14% in the future. Without the load indicator, conventional transformers are slumping rapidly toward 33% acceptance.

Boosts in service wire size are contemplated by over 45% of the electric companies. Most common change is from No. 6 to No. 4 or No. 2 copper or equivalent. But No. 6 remains the most used size while No. 8 slides off toward an insignificant future. Boosts in secondary wire size are contemplated by 24% of the utilities.





FACT: Corrosive atmosphere can't harm *Lifetime* meters

Corrosion can steal years of performance from your watthour meters . . . skyrocket maintenance costs. That's why Westinghouse gave its new Lifetime meters and sockets a corrosion-proof design which defies polluted atmosphere, salt vapor, heat, cold, dirt and moisture.

Aluminum, plastic, lacquer and enamel are used in conjunction with metal parts to help combat corrosion. All metal parts get protective treatments to keep them working smoothly, dependably.

For example, shafts and gears are gold finished. A chemical process is used to create a corrosion-resistant film on aluminum parts. This film actually becomes part of the metal, won't rub off or chip. Result: Westinghouse Lifetime meters run better, longer with less attention. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-40482

New Lifetime watthour meters

Type DA bottom-connected, type DS socket construction.

YOU CAN BE SURE...IF IT'S Westinghouse

Helping the industry meet its growing loads

Better Service Continuity From 50 Years of Condenser Bushing Research and Development

Long ago, Westinghouse realized that bushings on your transformers and breakers must be one of the strongest links in your system.

Over 50 years ago they designed the first bushings using the *condenser* principle to provide a smooth voltage gradient throughout the insulation. Continuous improvements since then plus developments such as vacuum oil impregnation and high-strength, one-piece porcelain have resulted in today's trouble-free Type "O" bushing which only Westinghouse can offer you.

The dependability of these *Type "O" condenser* bushings which assures service continuity to your customers has been proved by 38,650 bushings in the field which have given service exceeding 180,000 bushing years since 1942.

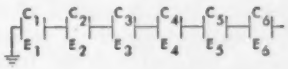
Another feature to provide both economy and ease of maintenance is the interchangeability of the Westinghouse bushings between transformers and breakers.

The same engineering leadership that developed this idea 50 years ago continues at Westinghouse today, searching out answers to your system problems . . . answers that, like the condenser bushing, will prove of greater and greater value to you as systems grow. J-97192

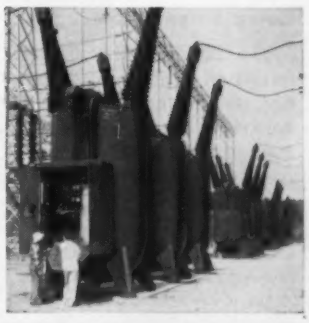
YOU CAN BE SURE...IF IT'S

Westinghouse

Type "O" Bushings . . . Trouble-Free Insulation



A series of equal capacity *condensers*, spaced concentrically around the conducting lead, provides uniform voltage stress not only throughout the insulation but also over the external surface. Oil impregnation under vacuum eliminates the possibility of voids in the insulation. This, together with the smooth *condenser* gradient, banishes internal corona with its resulting radio interference and insulation breakdown. The one-piece, high-strength porcelain is Westinghouse manufactured and engineered to coordinate with the bushing design.



At Ohio Valley Electric Company's Kyger Creek switchyard, these 330-kv, 25,000,000-kva circuit breakers are equipped with 330-kv Type "O" bushings as shown on the opposite page. For further details on Type "O" or Type "S" condenser bushings, call your Westinghouse sales engineer, or write Westinghouse Electric Corporation, P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa.

Keep Electric Co-ops Out of Politics . . .

REA Administrator Ancher Nelsen tells delegates. Meeting calls for increased federal spending on power but rejects proposal calling for extension of TVA

A warning to keep their co-ops out of politics was given to the more than 5,000 delegates attending the 14th annual meeting of the National Rural Electric Cooperative Association in St. Louis, Mo., Jan. 23-26, by Ancher Nelsen, Rural Eelectrification Administrator.

In a speech which contrasted sharply with the partisan and sometimes violently anti-private power diatribes of other speakers, the administrator said: "Your politics are your own business, but don't let your cooperative become a political football. When somebody's political ambitions begin to interfere with the farmers' needs we want to be sure to look at all the facts so that we can set the course straight."

Nelsen told the meeting farm usage of electricity has doubled in the past seven years and can be expected, conservatively, to triple by 1976.

This "means that we must find enough generating capacity to give us at least 45 billion kwhr. It also means we must increase system capacity to the point where the 1976 loads can be reliably handled."

Co-op Finances Strong

The administrator complimented the co-ops on their strong financial position, pointing out that three-fourths of borrowers are ahead of schedule in their payments. But power and other costs are increasing, system improvements will require more attention as consumption increases and returns per kwhr will drop as consumers move into lower rate blocks, he said.

"Nowhere is common sense more urgently needed than in the consideration of power supply," Nelsen continued. "There are great benefits springing from the ownership of a generation plant . . . (but) in the consideration of power plants we need to look at the act itself. Nowhere in the act is the administration permitted to use as justification pride of ownership or prejudice. We shall, however, proceed to finance power plants when the interest of the farmer can better be served by so doing."

NRECA General Manager Clyde T. Ellis told the meeting: "Evidence is pretty clear now that the Wall Street investor-control groups in charge of the private power empires have stepped up their campaign to destroy the rural electric cooperatives and power districts.

"In fact, a large segment of the private power companies—more than 100 of them—have admitted in their suit against us, in the Reddy Kilowatt versus Willie Wirehand matter, that they are attempting to take over our service area and our consumers wherever possible."

Ellis charged that "power monopoly propaganda is completely out of hand." He also warned "there is a drive to turn the atomic energy program over to the big monopolists and fence us out. . ." In his talk, Ellis succeeded in using various forms of the word "monopoly" 75 times.

KATHRYN RUARK of Georgia was elected Miss Rural Electrification of 1956

Rep Robert E. Jones (D-Ala.), chairman of a House subcommittee studying the Hoover Commission report on water resources and power, said the Hoover report was "one of the most disturbing documents ever to bear official government imprint."

The commission, he added, "simply refuse to see power as essential to higher productivity and higher standards of living for our people."

Power Issue Defined

On the other hand, Jones said the power issue in America today "is not so much an issue of private versus public power as it is an issue of abundance of low-cost power from whatever source."

"I believe that if private power companies can ever prove it is feasible for them to produce and distribute an abundance of low-cost energy, and have it available when and where it is needed, then the field is open to them."

Gov Fred Hall of Kansas warned against increasing REA interest rates and against changing the formulas to raise public power costs in multipurpose dams.

Like other Republicans, Hall continued, he was disturbed because some politicians "and their advisors who represent private interests are confused about their economics and politics. They especially confuse the two when it comes to public power and rural electrification."

Hall cited Dixon-Yates and Hells Canyon as "prime examples of this mistaken philosophy. . . . (They) should not have been decided alone on the principle of keeping the government out of business. They should have been decided primarily on the principle that the public interest outweighed private interest."

Private power companies were again

attacked by former Arkansas Gov Sidney McMath and James G. Patton, president of the National Farmers Union.

The successes of the political activities of the "power monopolies" during the past three years "have been both alarming and astounding," said McMath. If the power interests gain their objectives, they will establish the most powerful monopoly this country has ever seen," he added, urging "effective counter action."

Patton told delegates "the big utility companies, which are linked directly through their common origins in Wall Street to the big manufacturing companies that have been permitted and subsidized in the process to get a monopoly on atomic know-how, are holding back the use of atomic power for generating electricity." Patton also quoted Leland Olds as authority for the statement that co-ops could save money now if they could get atom-electric power.

Sen Stuart Symington (D-Mo.) called on government, co-ops and private companies to "work together, in harmony, for the maximum hydro-electric development of this country."

Sen Alexander Wiley (R-Wis.) noted that "this country is big enough for all types of bona-fide enterprises to prosper."

A number of panel discussions featured the four-day meeting. In one session, Mrs Evelyn Cooper, attorney for National Hells Canyon Association, predicted that federal courts would overrule the FPC license to Idaho Power Co for developments on the Snake River.

The panel forum on atomic energy heard Kenneth Kasschau, manager of engineering, atomic energy, Alco Products, Inc, express optimism about bringing down the power costs from the Army Package Power Reactor to levels comparable with many of the smaller power plants in use today.

The meeting, without rejecting any, passed 60 resolutions directed at Congress. But efforts to amend one resolution to permit geographical expansion of TVA by Congress were defeated. The original resolution, which was passed, called for defeat of a proposal before a Public Works subcommittee to limit sales of energy by TVA to customers within its area.

Other resolutions called for: restrictions on private company advertising costs; Congressional investigation of

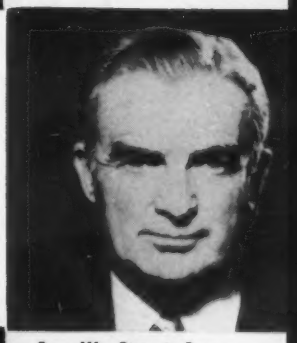
(*Continued on page* 64)

Ancher Nelsen, REA Administrator

Clyde T. Ellis, NRECA general manager

Rep Robert E. Jones (D-Ala.)

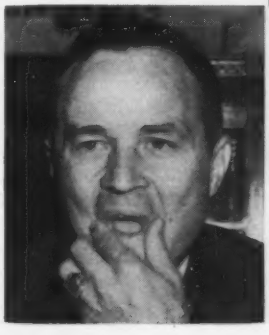
Gov Fred Hall of Kansas



Sen W. Stuart Symington (D-Mo.)

Sidney McMath, former governor of Arkansas

Sen Alexander Wiley (R-Wis.)



James G. Patton, president, National Farmers Union

NEWS ABOUT PEOPLE

Katterhenry, Gentry Appointed Ipalco VP's

R. R. KATTERHENRY

R. R. Katterhenry and W. A. Gentry have been elected vice presidents of Indianapolis Power & Light Co.

Katterhenry, whose most recent position was assistant vice president, began his electric utility career at Ipalco in 1916 after studying electrical engineering at Tri-State College. After serving as purchasing agent for a number of years, he was made an executive assistant in 1944. Katterhenry was named an assistant vice president of the company in 1951.

Gentry, new vice president in charge of operations, came to Indianapolis 11 years ago to assist in supervising Ipalco operations. He was appointed an assistant vice president of the company in 1951.

W. A. GENTRY

Wilhite Named Executive Engineer

Richard D. Wilhite has been appointed executive engineer of each company in a utilities group composed of Concord Electric Co, Exeter & Hampton Electric Co, Fitchburg Gas & Electric Light Co, and Rockland Light & Power Co. He will remain at the Boston headquarters of the group.

Wilhite, rate engineer and assistant consulting engineer since 1929, is a graduate of University of Illinois and did graduate work at Massachusetts Institute of Technology and Harvard Graduate School of Business Administration.

Herbert C. Towle has been named purchasing agent of the Exeter, Fitchburg, and Concord companies, which he joined in 1922. Since 1952 he has served them as assistant purchasing agent.

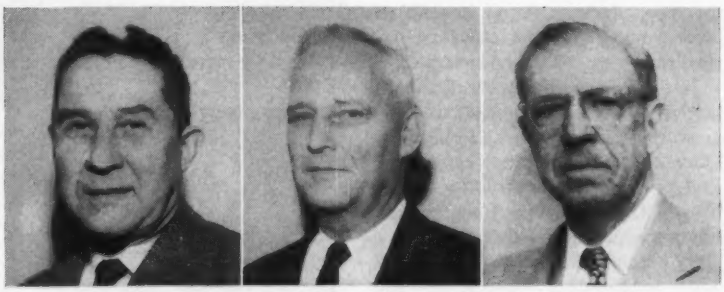
R. D. WILHITE

Stone & Webster Elects 3 Vice Presidents

Stone & Webster Engineering Corp has announced the appointment of Edward J. Ford, Harold J. Sykes, and Edwin H. Krieg as vice presidents of the corporation.

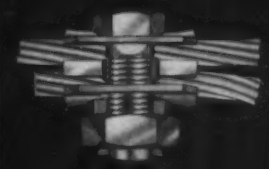
Until his present appointment, Ford was senior construction manager with headquarters in the company's New York offices, and Sykes served as construction manager in the Boston office.

Both Ford and Sykes will continue their responsibilities in the direction of construction projects of the organization in the power and industrial fields throughout the world.



E. J. FORD H. J. SYKES E. H. KRIEG

In his new position, Krieg, who was recently transferred to the New York office, will continue his activities as a consulting engineer and will devote his attention to Stone & Webster's interests in the steam power and related fields. The company's central headquarters are located in Boston.



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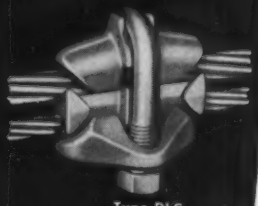

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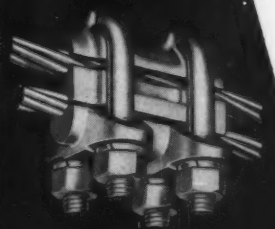

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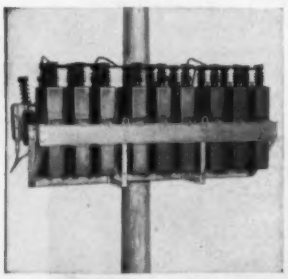
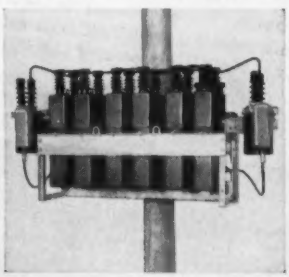
JASPER BLACKBURN CORPORATION
35 Madison St., St. Louis 6, Mo.
Phone MAin 1-2821

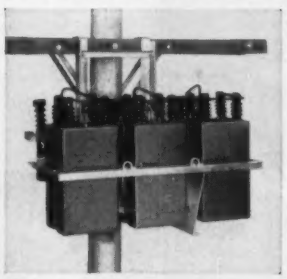
L-M's new 50 kvar capacitors are now available in 600 kvar switched capacitor racks. Assembly weighs only 43% more than a 300 kvar rack. Capacitor unit has same width, same thickness as a 25 kvar capacitor and will fit into existing NEMA standard hangers and L-M single-row racks.



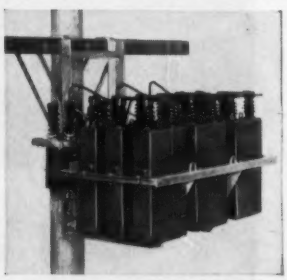
450 kvar single-row switched capacitor rack with L-M's Elemex 50 kvar capacitors. Weighs only 12% more than a 300 kvar single-row rack with 25 kvar capacitors.



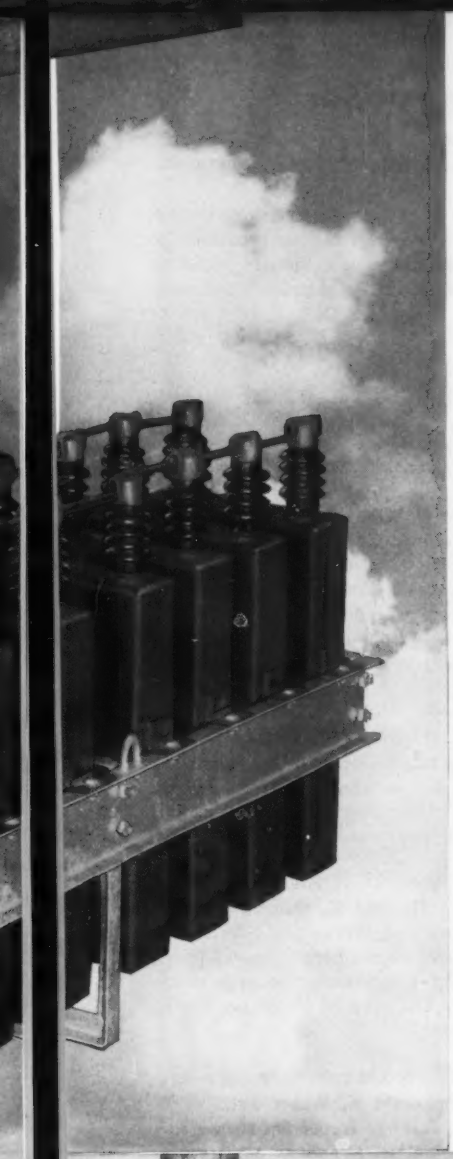
300 kvar single-row switched capacitor rack with L-M's Elemex 50 kvar capacitors. Assembly is quick and easy to install, inspect, and maintain.

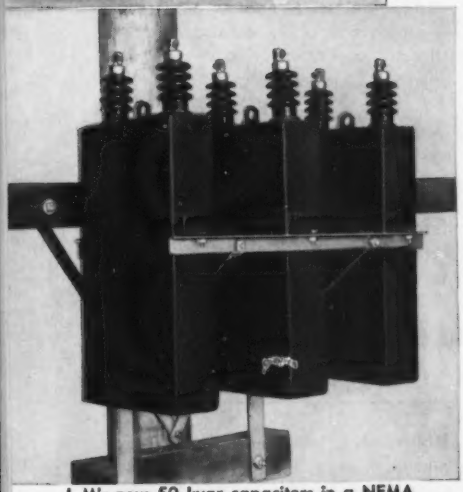


300 kvar multi-row switched capacitor rack with L-M's 50 kvar capacitors. Switched racks are supplied with dependable L-M Kyle type NR oil switches.



450 kvar, 2400 volt multi-row switched capacitor rack with L-M's 50 kvar capacitors. Weighs only 150 pounds more than a 300 kvar rack with 25 kvar capacitors.





L-M's new 50 kvar capacitors in a NEMA standard hanger. The capacitor has the same width, same thickness as 25 kvar capacitor and 10 inches of additional height. The three units provide 150 kvar—50% more than four 25 kvar units.

L-M's New 50 KVAR Capacitors Provide Greater Capacity Per Pole

Offer less weight and less pole space per KVAR

By **N. K. DELANEY**
Product Manager
Capacitors and Regulators
Line Material Company

Now you can hang capacitor racks of larger capacity on a pole with L-M's new 50 kvar Elemex® capacitors. Racks are factory-assembled and wired, shipped ready to install on distribution systems rated 2400 to 13,800 volts, multi-grounded wye. Bank sizes may be up to 450 kvar switched, 600 kvar unswitched multi-row racks, and up to 600 kvar switched or unswitched single-row racks.

Less Weight per KVAR

Line Material's new 50 kvar, 2400 volt capacitor weighs 109 pounds compared to 68 pounds for a 25 kvar unit. A 600 kvar, 2400 volt unswitched multi-row rack weighs only 51% more than a 300 kvar rack, and a 600 kvar, 2400 volt switched single-row rack weighs only 43% more than a 300 kvar rack.

Less Space per KVAR

L-M's new 50 kvar unit has the same width, same thickness as a 25 kvar capacitor and only 10 inches of additional height. It fits into existing NEMA standard hangers and into L-M's present single-row rack. Capacity of a single-row rack can be *doubled* with L-M's 50 kvar capacitors. A 450 kvar single-row switched rack with 50 kvar capacitors is approximately 2 feet narrower than a 300 kvar rack with 25 kvar capacitors. Handling, installation and maintenance costs per kvar have all been reduced with L-M's new 50 kvar unit.

Other Features of L-M's Elemex Capacitors and Capacitor Rack Assemblies

Elemex capacitors are individually dried and completely impregnated under vacuum with low-temperature Elemex liquid dielectric.

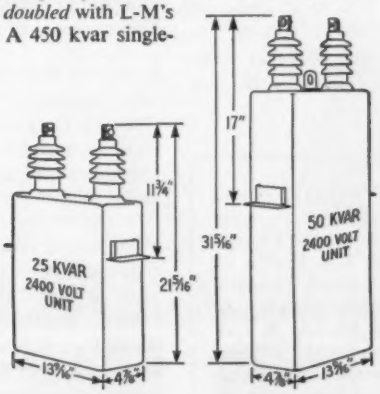
Unit has strong solder-sealed bushings of one-piece wet-process porcelain, "Paragroove" clamp-type connectors, and aluminum metallic coating under alkyd resin paint.

Assemblies have only one plug-in connection point per phase for control wiring, and one terminal box for all three phases.

Assemblies are of complete bird-proof construction; terminals have neoprene rubber caps, plus 5 kv insulated conductor for high-voltage connections.

Get Complete Information

Ask the L-M Field Engineer for information on features, design, and delivery on the new 50 kvar Elemex capacitors and capacitor equipments. Or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



Only 10 inches of additional height gives twice the capacity.

LINE MATERIAL

Elemex® Capacitors

H. E. BUMGARDNER

Detroit Edison Promotes Bumgardner

Harvey E. Bumgardner has been appointed assistant to the president of Detroit Edison Co. In addition to handling special assignments, he will continue to supervise the utility's international technical exchange programs.

Bumgardner, a graduate of University of Michigan with a mechanical engineering degree, has been with Detroit Edison 31 years. After serving in various capacities in the production and research departments, he was appointed assistant to the vice president and controller in 1953. He has also served as coordinator of the company's technical exchange programs for the past seven years.

PERSONAL BRIEFS

New power manager for Portland General Electric Co is **Arthur J. Porter,** formerly superintendent of production. In addition to performing the duties attached to his former position, he will have responsibility for planning of the company's power supply and for maintenance of contracts with Pacific Northwest Power Pool on power supply matters.

Personnel changes at South Carolina Electric & Gas Co include appointment of **W. S. Rodgers,** formerly Columbia Division manager, as assistant to the general manager, commercial electric department; **C. C. Lawson,** formerly manager of community and agricultural department, succeeds Rodgers as commercial manager, Columbia Division; and **Calvin H. Brown,** formerly community development representative, Columbia Division, becomes assistant to Lawson.

Virginia Electric & Power Co has announced that **Forrest U. Ross,** Richmond manager, has been appointed to the public relations staff of the company. He is succeeded at Richmond by **W. N. Cummins, Jr,** now personnel director.

CORRECTION:

In the Jan. 9 issue of Electrical World, page 138, Phillip G. Porcher was incorrectly reported to have been made manager of South Carolina Electric & Gas Co's electric commercial department for the system. His actual position is that of manager of community development for both Columbia and Charleston Divisions.

Aldo M. deBellis, assistant electrical engineer of Consolidated Edison Co of New York, Inc, and 1954 winner of American Institute of Electrical Engineers' Lamme Medal, has retired.

Hugh C. Wyland has joined Commonwealth Services, Inc, as head of the industrial relations department.

Richard S. Arthur has been named manager of marketing administration, product service, and marketing personnel development for General Electric Co's large motor and generator department . . . GE has designated **George G. Gabel** manager of the semiconductor products manufacturing operation in Syracuse.

E. W. Charlesworth, tubing and rod sales manager since 1947 for Kimble Glass Co, subsidiary of Owens-Illinois, has joined the administrative sales staff of Kimble as consultant on tubing and rod business and will assume additional responsibilities in the Administrative Sales Division. **James R. Sims** succeeds Charlesworth.

C. G. Crawford has been designated sales manager for Baldwin-Lima-Hamilton Corp's entire line of hydraulic turbines and related equipment. He previously held the position of Pelton Water Wheel Division sales manager.

New general sales manager for Westinghouse Electric Corp's Sturtevant Division is **James W. Wilcock.** He was formerly general manager of sales of Oliver Iron & Steel Corp, Berry Division . . . **Alonzo B. Meredith** has been named to the newly created post of national account sales manager of Westinghouse's Lamp Division. His previous position was western New York sales representative.

Arthur C. Westrom, chief engineer of Hubbard & Co, has been appointed director of research and development. He succeeds **Charles L. Stroup,** who has been vice president in charge of research. Stroup will continue to serve Hubbard in a consulting capacity.

Alexander N. Shealy has joined the electrical engineering section of Kaiser Aluminum & Chemical Corp's department of metallurgical research as director of transmission line research and development.

Four Wheel Drive Auto Co has appointed **Howard R. Canada** director of parts and service . . . **Peter B. McSherry, Jr,** has been promoted from assistant sales manager to sales manager of The Bristol Co's Socket Screw Division.

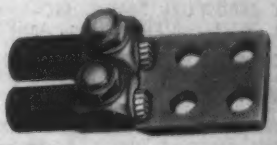
Radio Corporation of America has named **Arnold K. Weber** director of manufacturing. Weber has been associated with RCA and its predecessor companies since 1918, and has been director of organization development for the past three years.

Ralph L. Hamer has been designated division manager for Line Material Co's Central Division, with offices in North Kansas City. In his new position he has assumed the duties of **William E. Bracey,** who has been transferred to manage the company's Southwest Division with headquarters in Dallas.

OBITUARY

Robert J. Throckmorton, 64, vice president of Virginia Electric Power Co's Tidewater region, died recently in Norfolk after a brief illness.

how's your QA-IQ?



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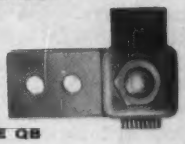

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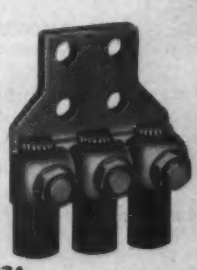

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MEETINGS CALENDAR

FEBRUARY

EDISON ELECTRIC INSTITUTE—Electrical Equipment Committee, Homestead, Hot Springs, Va., Feb. 13-14; Commercial Lighting Committee, Hotel Shoreham, Washington, D. C., Feb. 15-16; Residential Promotion Committee, New York, Feb. 16-17; Commercial Cooking & Water Heating Committee, The Biltmore Hotel, Atlanta, Feb. 16-17; Meter & Service Committee, Hotel Cleveland, Cleveland, Ohio, Feb. 20-22.

PENNSYLVANIA ELECTRIC ASSOCIATION—Communications Committee (Winter Meeting), Adelphia Hotel, Philadelphia, Pa., Feb. 13-14; Systems Operation Committee, Hotel Statler, New York, Feb. 16-17; System Planning Committee (Winter Meeting), Hotel Roosevelt, Pittsburgh, Pa., Feb. 20-21; Prime Movers Committee Meeting, Ben Franklin Hotel, Philadelphia, Pa., Feb. 23-24.

AMERICAN SOCIETY OF CIVIL ENGINEERS—National Winter Convention, Dallas, Tex., Feb. 13-17.

CALIFORNIA MUNICIPAL UTILITIES ASSOCIATION—24th Annual Conference, Mayfair Hotel, Los Angeles, Calif., Feb. 14-17.

AMERICAN MANAGEMENT ASSOCIATION—Midwinter Personnel Conference, Palmer House, Chicago, Ill., Feb. 15-17; 2nd Annual Electronics Conference & Exhibit, Hotel Commodore, New York, Feb. 27-29.

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS—Annual Spring Meeting, Mayflower Hotel, Washington, D. C., Feb. 17-18.

ROCHESTER ELECTRICAL EXPOSITION—War Memorial Building, Rochester, N. Y., Feb. 18-25.

NATIONAL ADEQUATE WIRING BUREAU—12th Annual Conference, LaSalle Hotel, Chicago, Ill., Feb. 23-24.

AMERICAN SOCIETY FOR TESTING MATERIALS—Committee Week, Hotel Statler, Buffalo, N. Y., Feb. 27-March 2.

MARCH

SOUTHERN SAFETY CONFERENCE, INC—Southern Safety Conference & Exposition, Hotel Biltmore, Atlanta, Ga., March 4-6.

SOUTHEASTERN ELECTRIC EXCHANGE—23rd Annual Conference, Boca Raton, Fla., March 12-14.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS—12th Annual Conference, Hotel Statler, New York, March 12-16.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION—Edgewater Beach Hotel, Chicago, Ill., March 12-16.

EDISON ELECTRIC INSTITUTE—Industrial Relations Committee, Muehlebach Hotel, Kansas City, Mo., March 15-16; Street Lighting Committee, Minneapolis, March 23-24; 22nd Annual Sales Conference, Edgewater Beach Hotel, Chicago, March 26-29.

TENNESSEE VALLEY PUBLIC POWER ASSOCIATION—10th Annual Meeting, Farragut Hotel, Knoxville, Tenn., March 30-31.

APRIL

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—South West District Meeting, Baker Hotel, Dallas, Tex., April 2-4; Great Lakes District, Fort Wayne, Ind., April 16-18.

INDIANA ELECTRIC ASSOCIATION—16th Annual Young Men's Utility Conference, Hotel Van Orman, Fort Wayne, Ind., April 4-5.

ELECTRICAL MAINTENANCE ENGINEERS ASSOCIATION—8th National Biennial Electric Industry Show, Shrine Exposition Hall, Los Angeles, Calif., April 5-7.

MARYLAND UTILITIES ASSOCIATION—Annual Business Conference, Lord Baltimore Hotel, Baltimore, Md., April 6.

MIDWEST RESEARCH INSTITUTE—Symposium for Management on Applications of Analog Computers, Hotel Phillips, Kansas City, Mo., April 10-11.

POINT OF PURCHASE ADVERTISING INSTITUTE—10th Annual Symposium & Exhibit, Hotel Sheraton Astor, N. Y., April 10-12.

NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION—Engineering & Operation Section, Hotel Vancouver, Vancouver, British Columbia, April 11-13.

SOUTHEASTERN ELECTRIC EXCHANGE—Engineering & Operation Section, Bon Air Hotel, Augusta, Ga., April 12-13.

EDISON ELECTRIC INSTITUTE—National Conference of Electric & Gas Utility Accountants, sponsored jointly with AGA, Hotel Commodore, New York, April 16-18; Accident Prevention Committee, Sheraton Hotel, St. Louis, April 30-May 2.

GREATER NEW YORK SAFETY COUNCIL—26th Annual Safety Convention & Exposition, Hotel Statler, New York City, New York, April 16-20.

ATOMIC INDUSTRIAL FORUM, INC—Atomic Energy Conference, Atlanta, Ga., & Oak Ridge, Tenn., April 17-19.

PACIFIC COAST ELECTRICAL ASSOCIATION—Administrative Services Section Meeting, Huntington-Sheraton Hotel, Pasadena, Calif., April 18-19.

MISSOURI VALLEY ELECTRIC ASSOCIATION—Engineering Conference, Hotel President, Kansas City, Mo., April 18-20.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—2nd Conference on Recording & Controlling Instruments, Bradford Hotel, Boston, April 26-27.

MAY

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—North Eastern District Meeting, Rochester, New York, May 2-4.

EDISON ELECTRIC INSTITUTE—Accident Prevention Committee, Sheraton Hotel, St. Louis, Mo., May 2-4; Purchasing & Stores Committee, Sheraton Plaza Hotel, Boston, Mass., May 7-9; Commercial Electric Cooking Conference, Sheraton Hotel, Chicago, Ill., May 8.

* **FIRST NATIONAL FARM WIRING CONFERENCE**—LaSalle Hotel, Chicago, Ill., May 3-4.

AIR-CONDITIONING & REFRIGERATION INSTITUTE—Annual Meeting, The Homestead, Hot Springs, Va., May 7-9.

AMERICAN WELDING SOCIETY—Fourth Welding Show, Memorial Auditorium, Buffalo, N. Y., May 9-11.

PACIFIC COAST ELECTRICAL ASSOCIATION—Annual Convention, Las Vegas, Nevada, May 14-16.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Design Engineers—Design Engineering Conference, Convention Hall, Philadelphia, Pa., May 14-17.

PENNSYLVANIA ELECTRIC ASSOCIATION—Relay and Electrical Equipment Committees, Hotel Roosevelt, Pittsburgh, Pennsylvania, May 17-18.

INDUSTRIAL HEATING EQUIPMENT ASSOCIATION, INC—Spring Meeting, The Homestead, Hot Springs, Va., May 20-23.

NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION—Business Development Section, Benjamin Franklin Hotel, Seattle, Wash., May 21-23.

CIGRE—16th Annual International Conference, Paris, France, May 30-June 9.

JUNE

* **EDISON ELECTRIC INSTITUTE**—24th Annual Convention, Atlantic City, June 4-7.

* **NATIONAL ASSOCIATION OF ELECTRICAL DISTRIBUTORS**—48th Annual Convention, Ambassador-Chelsea Hotels, Atlantic City, Week of June 10.

* **AMERICAN SOCIETY OF MECHANICAL ENGINEERS**—Semi-annual meeting, Statler Hotel, Cleveland, Ohio, June 17-21.

* **AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS**—Summer and Pacific General Meetings, San Francisco, California, June 25-29.

* **NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION**—Accounting & Business Practice, Multnomah Hotel, Portland, Oregon, June 21-23.

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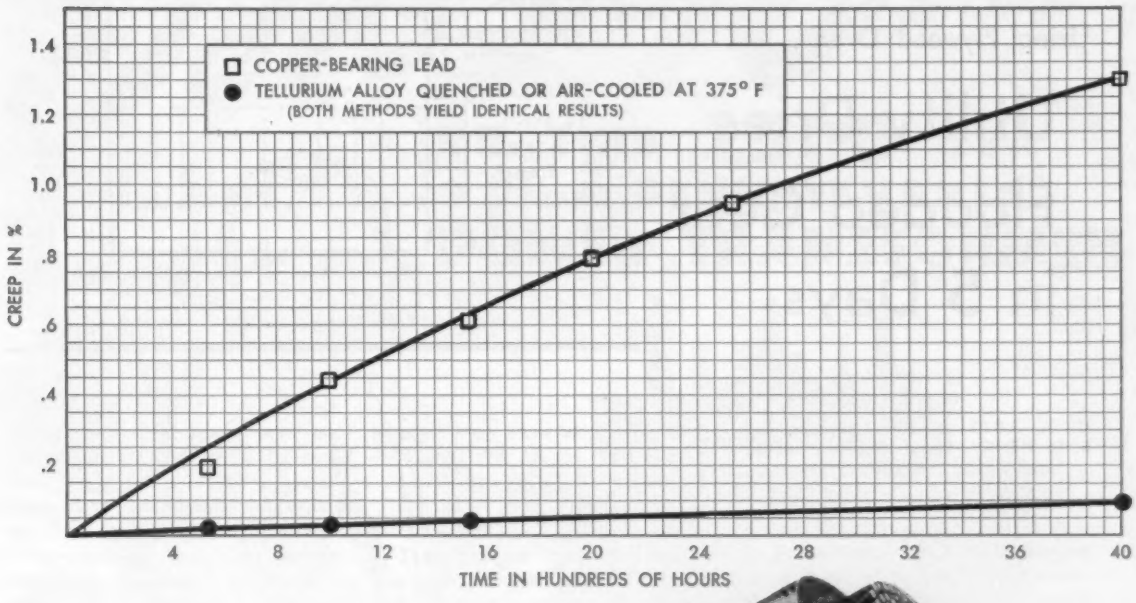
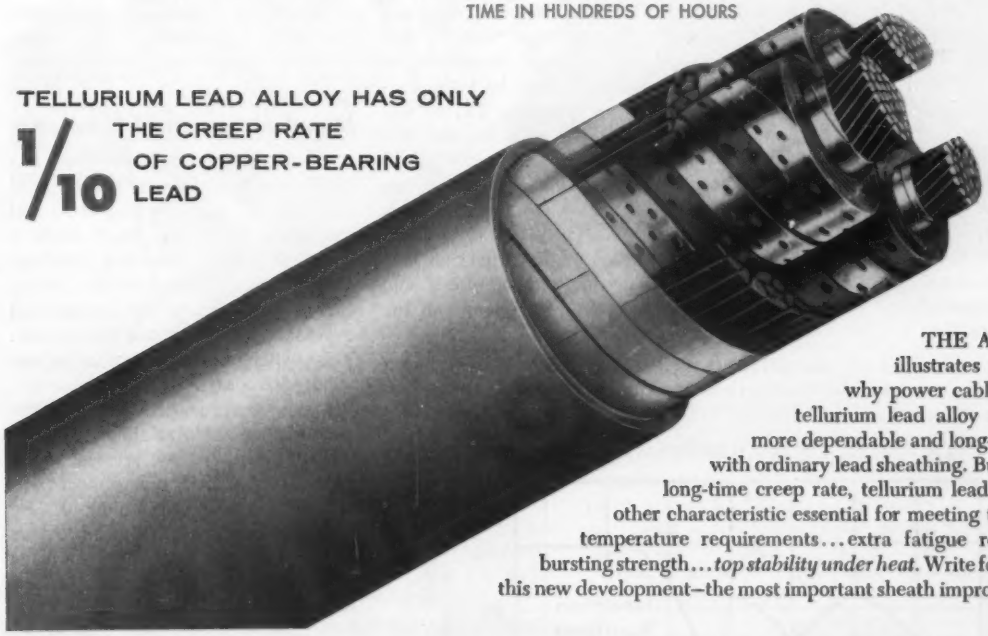
* Additions this week.

ROEBLING PAPER POWER CABLE WITH TELLURIUM LEAD ALLOY SHEATH

CREEP OF TELLURIUM LEAD ALLOY AND OF COPPER-BEARING LEAD AT 200 PSI - 150° F



TELLURIUM LEAD ALLOY HAS ONLY 1/10 THE CREEP RATE OF COPPER-BEARING LEAD



THE ABOVE GRAPH illustrates one big reason why power cable with Roebling tellurium lead alloy sheath is vastly more dependable and long-lived than cable with ordinary lead sheathing. But besides its low long-time creep rate, tellurium lead alloy has every other characteristic essential for meeting today's load and temperature requirements... extra fatigue resistance... high bursting strength... *top stability under heat.* Write for full facts about this new development—the most important sheath improvement in years.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 11-15 STILLING ST. • CHICAGO, 6525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • PITTSBURGH, 1723 HENRY W. OLIVER BLDG. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.

SUBSTATIONS
Maintenance

Using Plywood Oven . . .

Utility Dries Flooded Gear in 5 Days

C. A. LOTZ, Electrical Engineer, and **S. D. HENRY**, Eastern Division Operating Superintendent, Metropolitan Edison Co, Reading, Pa.

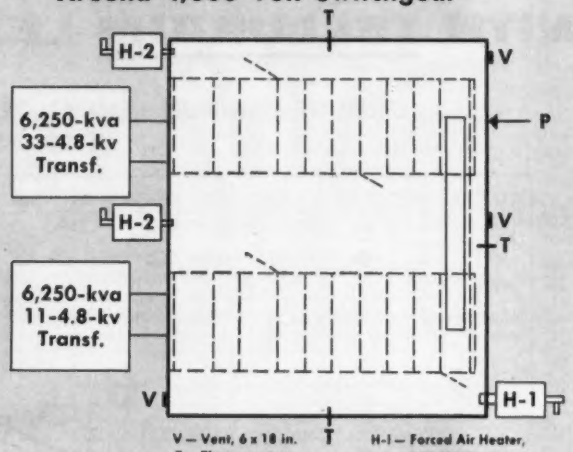
A plywood oven speeded Metropolitan Edison Co's reconditioning of outdoor switchgear at the Dock Street Substation following last August's floods in the Delaware Valley of Pennsylvania. When the switchgear had been thoroughly washed, the oven was built around it in 8 hours; and three portable air heaters were applied.

The heaters were of the high-pressure gun type, using kerosene as fuel. One unit had a heat rate of 350,000 BTU per hr, burned 2.5 gph, with a nozzle discharge of 1,200 cfm, and was approximately 75-by-38-by-51 in. The other units were rated at 189,000 BTU per hr, 1.35 gph, 550-cfm nozzle discharge, and were approximately 46 by 23 by 30 in.

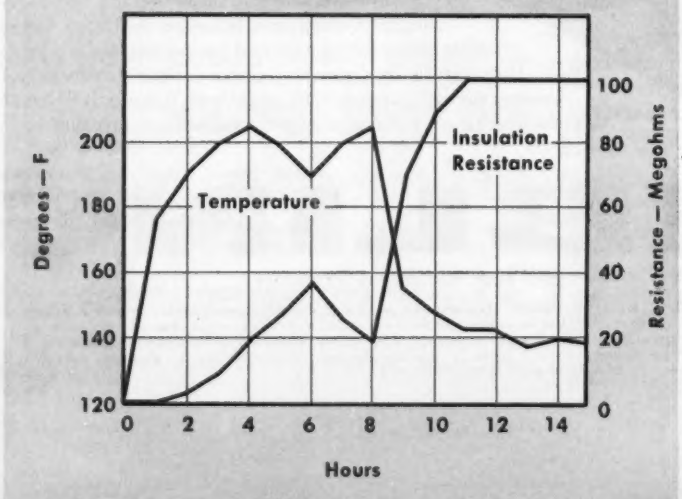
Heaters, vents, and thermometers were arranged as in the diagram. Test leads were attached to each phase and ground of each bus section and brought out so that insulation resistance readings could be taken during the drying operation. Drying was started at 5 PM, Aug 22, and was completed at 8 AM, Aug. 23. Typical insulation resistance readings are shown in the graph. Initially, temperatures were maintained at 175 to 200F.

Examination of the switchgear at 1 AM indicated the temperature should be dropped as the compound in the bus joint connections was showing signs of softening. Consequently, it seemed prudent to bring out more temperature indications from some internal parts. The heating cycle was revised to raise the temperature gradually to approximately 200F, then drop it to about 170F, holding it there until resistance readings leveled off.

Plywood Enclosure Makes Oven Around 4,800-Volt Switchgear



Heating to 200F for 8 Hr Boosts Insulation to 100 Megohms



Manufacturers Dried Breakers

Dock Street Substation has two 6,250-kva transformers with load ratio control, one operating at 33 and the other at 11 kv. Each feeds a separate 4.8-kv bus and contains seven air circuit breakers. Both buses can be tied together by an enclosed overhead bus and a bus tie breaker. This switchgear had been in service about two years.

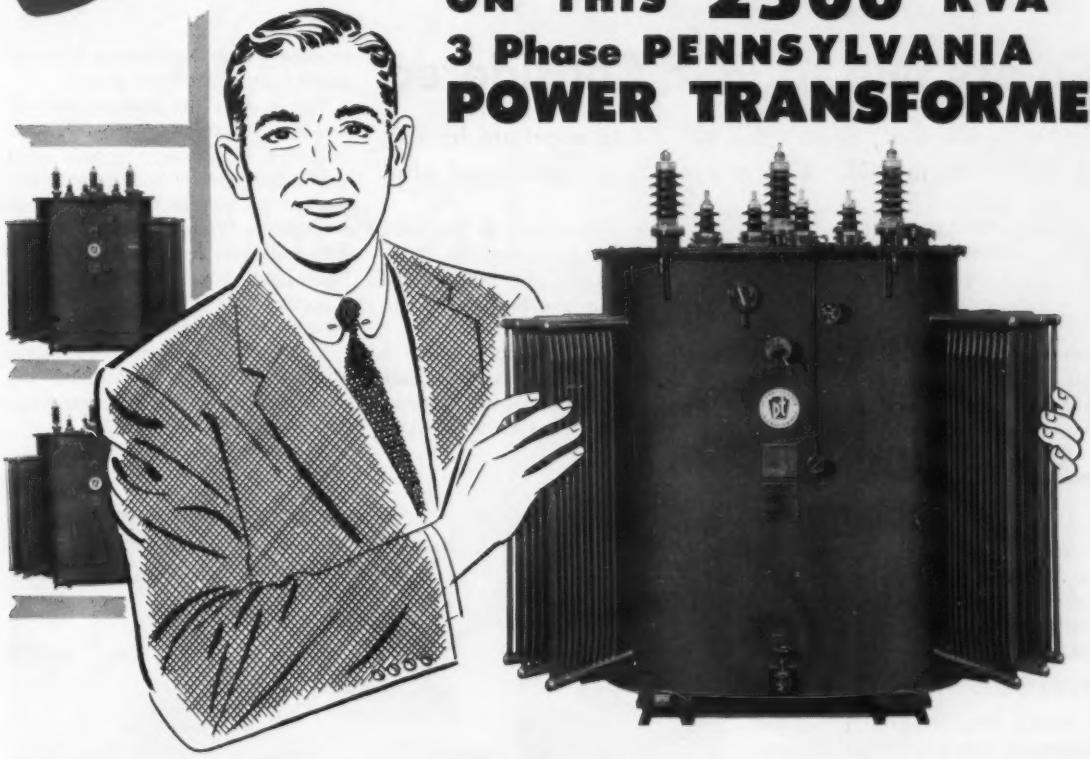
Cleaning up started in the afternoon of Aug. 20. Arc chutes were removed from the first breaker to be washed, but their replacement was difficult because of swelling of the barrier insulation. The other breakers were washed with all parts in place and returned to the manufacturer's service shop for emergency drying, insulation resistance tests, and examination. They were returned on Aug. 24 and 25 and were given operation tests preparatory to their use.

On Aug. 25, the Easton load was transferred to Dock Street. Starting Sept. 10, the air circuit breakers were sent, two at a time, to the manufacturer's service shop for complete over-

(*Continued on page* 48)

Save $943.00 AND MORE

ON THIS 2500 KVA 3 Phase PENNSYLVANIA POWER TRANSFORMER



Actually you can save as much as $1055* on 2500-kva, three-phase transformers like this one — by taking advantage of the cost reductions Pennsylvania is able to pass along to you when you specify *Standard Parts* power transformers. "Standard Parts" means that kva, voltages, and accessories are within the range of standardized units outlined in ASA Standards C57.12A.

Similar savings — *up to 8% of the basic cost of a transformer* — can be yours for any units 833 kva through 5000 kva single phase, and 750 kva through 10,000 kva three phase, in voltages up to 69 kv.

And . . . your initial dollar savings are just part of the story. You also . . .

Get quicker deliveries, because designs are already made up and many standard parts are already in stock.

Save on installation, because most *Standard Parts* power transformers are shipped completely assembled and ready to connect to your lines.

Save on maintenance, because Pennsylvania *Standard Parts* power transformers feature all-sealed construction, which means there are no external auxiliary tanks and fittings to maintain.

If your transformer requirements fall within the sizes listed above, make it a point to find out about Pennsylvania *standard parts* power transformers. You may save as much as 8%!

* 34,400 volts is a standard high voltage rating. The 31,350△ rating of this transformer is within the optional high voltage range, adding 1% to the net cost of the *Standard Parts* transformer.

PENNSYLVANIA TRANSFORMER COMPANY

A McGraw Electric Company Division **CANONSBURG, PA.** *Greater Pittsburgh District*

Utility Dries Gear

(*Continued from page* 46)

haul. On this schedule overhauling the entire set of breakers took about two months.

Relays and meters were removed from the switchgear before the wash down. Over-current relays were washed with city water, dipped in carbon tetrachloride, and air-dried in sunshine. Jewels, contacts, and air gaps were then cleaned and the relays re-calibrated. Many of the over-current relays were ready for re-installation before the primary switchgear was re-energized.

Meters and relays containing potential coils could not be salvaged nor could battery chargers, small auxiliary transformers, and rectifiers. Replacements for these were purchased and delivered within a few weeks after the orders were placed.

Dock Street is on the south side of Easton, Pa., on the Lehigh River and, combined with Lafayette Substation on the north side along Bushkill Creek, feeds 19 vaults in downtown Easton. Both stations were de-energized at 12:18 PM, Aug. 19, because of rapidly rising water. The crest completely submerged outdoor metal-clad switchgear at both locations.

Co-op Sale to PGE Considered

. . . as Sandy, Ore., co-op votes 449-204 to negotiate for sale of its system to PGE which responds with conditional offer

Another Pacific Northwest public utility body is considering selling its facilities to a neighboring investor-owned utility.

In response to a bid for negotiations from Sandy, Ore., Electric Cooperative, Portland General Electric Co recently made a conditional offer to buy the co-op's system.

PGE's offer came after the co-op's members had voted 449 to 204 in favor of opening negotiations with the investor-owned utility.

The decision to consider disposing of its facilities was made largely because of the co-op's poor financial condition exemplified by a $932,888 loan debt.

PGE's Delzell Responds

PGE's Pres Thomas W. Delzell responded with a "statement of intentions" which read in part:

"The co-op facilities will be brought into and become a part of PGE's fully integrated system and operated as a part of it and not separately nor through a subsidiary group.

"We will serve all co-op customers at PGE's regular postage-stamp rates, including summer homes, no matter whether they are at the end of the line or not.

"We will offer employment to all full-time paid employees of the co-op at the same or higher compensation. . . .

" We will maintain the Sandy office and repair department in the interest of improved service. Consequently, there will be no curtailment of the Sandy payroll."

Delzell's statement did not mention the co-op's loan debt with the Rural Electrification Administration. Presumably, however, the utility would have to assume the obligation if it purchased the system.

Although an agreement to sell is still many steps away, there are indications that negotiations will continue. For the economics of the Sandy operation have been deteriorating in recent months despite post-war growth.

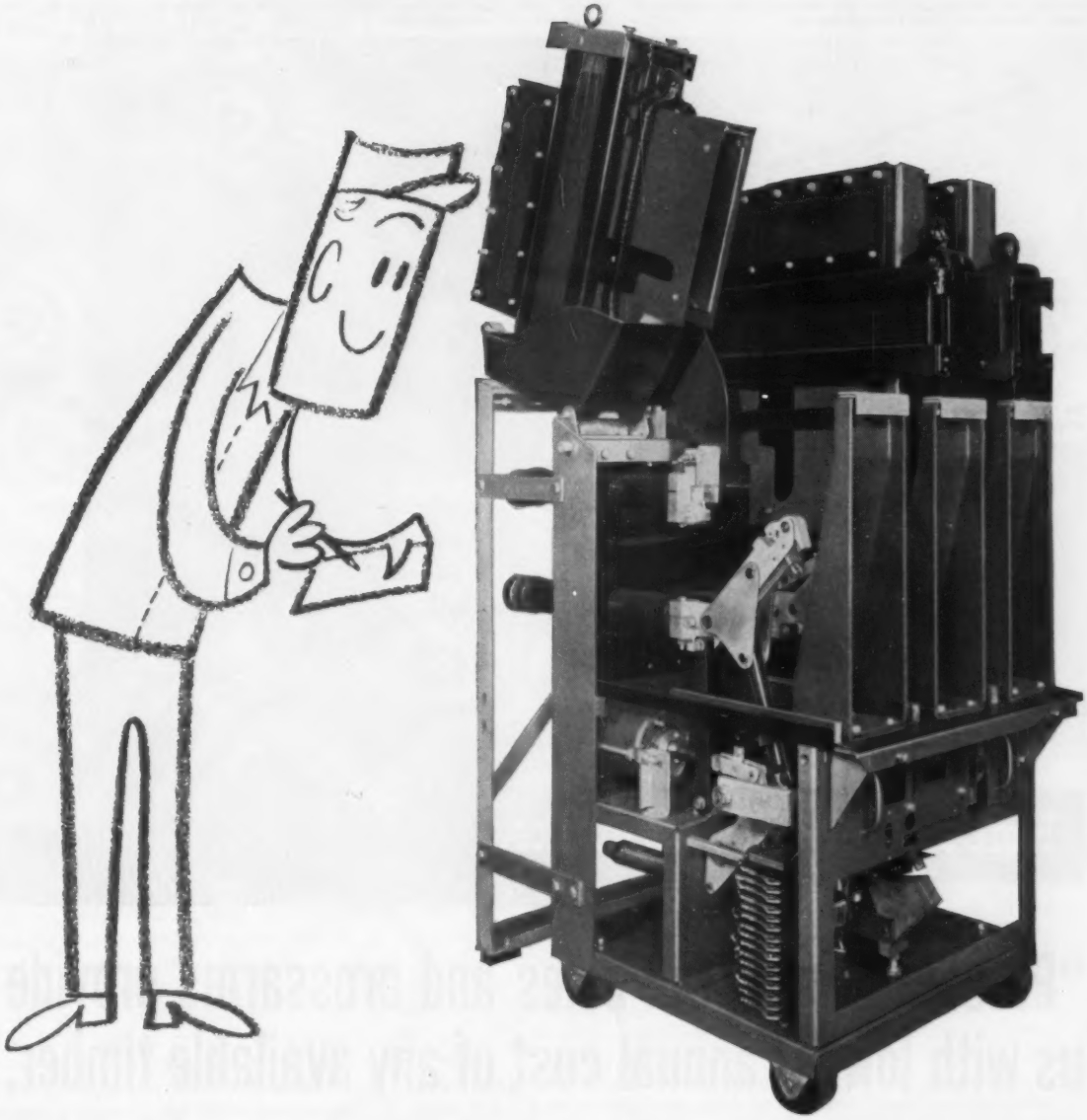
Sale of the co-op property must be voted by two-thirds of the members. But even so prospects appear good that another public body may follow the trail of Stevens County PUD in neighboring Washington. The PUD's properties were recently purchased by Washington Water Power Co when a popular vote in the county favored service by the private utility.

Sandy's 898-member system serves a rural area east of Portland and reaches to mile-high Timberline lodge on snow-capped Mt. Hood.

PG&E Stator Makes Big Haul

A long short haul requiring seven to eight days to travel nine miles, was recently made to move a second giant stator from Camp San Luis Obispo, Calif., to Pacific Gas & Electric Co's Morro Bay Plant. Traffic along the highway route was blocked while the 82-wheel carrier moved night and day to take the 217½-ton stator to its destination.

Shipment from Schenectady, N. Y., to the West Coast, a distance of 3,100 mi, took 30 days including various layovers. No train hauling the stator, which was made by General Electric Co, travelled faster than 30 mph. Another stator for Morro Bay was moved similarly in 1954.



SEE VALUE HERE YOU'LL SEE NOWHERE ELSE

Operating engineers in the electrical industry often say you can see the higher quality in I-T-E switchgear even when you stand 'way back.

Of course, they're only partly right. You can easily see the practical component arrangement, the all-welded steel construction with compartments designed to retain shape even when lifted as a unit, and the clean, neat appearance. These are standard on all I-T-E switchgear.

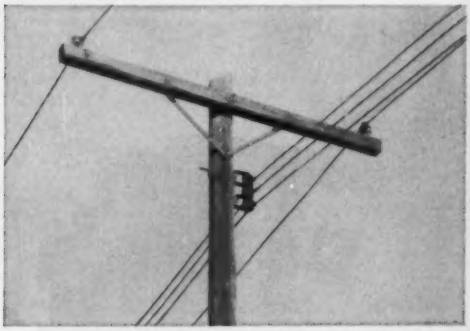
But we want you to look closer—see even more. For example, in Metal-Clad Switchgear: the easy-to-service horizontal drawout design; the tilting arc chutes; the extra-heavy insulation. There's quality in every detail—quality that means dollars' more value for your switchgear investment and years' longer troublefree service.

Why not phone the I-T-E office nearest you. Or write for bulletin 7004 giving a complete description of 5, 7.5 and 15 kv switchgear. I-T-E Circuit Breaker Co., 19th & Hamilton Sts., Phila. 30, Pa.

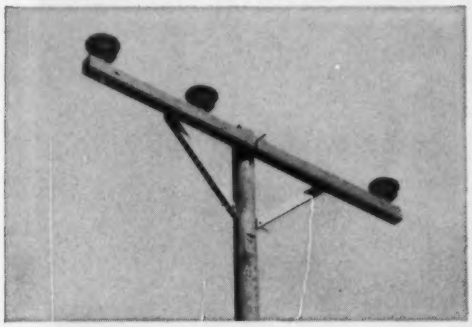
I-T-E

I-T-E CIRCUIT BREAKER COMPANY · Switchgear Division

IN 1939, the first pressure-creosoted crossarms were installed on poles of the Monongahela Power Company.



IN 1956, because of past performance records, pressure-creosoted poles and crossarms were standard specification for Monongahela.



IN 1936, the first pressure-creosoted poles were installed on Monongahela lines. Mr. Wayne Lawler, Special Representative Transmission and Distribution, points to the dating nail on this still serviceable veteran.

Here's Proof of Performance...

"Pressure-creosoted poles and crossarms provide us with lowest annual cost of any available timber."

The Monongahela Power Company, Fairmont, West Virginia, first used pressure-creosoted poles in 1936. Today they serve 200,000 customers in an area of 12,596 square miles and have 307,000 utility poles, of which 252,000 are pressure-creosoted. Some of these poles are in use on a 1560-mile line which carries 22,000 to 132,000 volts. The power requirements in this part of West Virginia have doubled during the past 10 years.

Mr. S. S. Russell, Senior Lines Engineer, explains why Monongahela Power has standardized on pressure-creosoted poles in sizes of 60 feet and less. "This practice has been established because the performance of creosote treated structures has exceeded the predictions upon which its use was commenced in 1936. On our new 13-mile, 33,000-volt line in Pendleton County, W.Va., we are using pressure-creosoted poles and crossarms exclusively."

United States Steel will be happy to give you more data on pressure-creosoting with USS CREOSOTE. Just get in touch with our nearest Chemical Sales Office or write directly to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS CREOSOTE

SALES OFFICES IN PITTSBURGH, NEW YORK, CHICAGO, CLEVELAND, SALT LAKE CITY AND FAIRFIELD, ALA.

UNITED STATES STEEL

A. B. CRAIG J. C. PARKER R. A. HORENBERGER P. L. BELLASCHI G. VON FUCHS F. S. OLIVER

Experts Extend Oil Program to Cable

Water-in-oil meter monitors quality in filling pipe-type cable. Doble conferees are advised that company will participate in oil improvement program

Insulating oil again featured the annual Doble Client Conference, Jan. 23-29, at Boston. A symposium on handling and testing oil for high-voltage cable and several papers about cable testing revealed new activities.

Pipe-type cable, installed recently by Boston Edison Co as the first link of an inner 110-kv ring, required new techniques to prepare and maintain some 50,000 gal of oil. The pumping plant for these 2 cables, said A. B. Craig, must inject 2,600 gal at 4 gpm if full load is dropped under winter temperature conditions. Unique modification enabled this plant to process oil delivered in tank cars for initial filling of the lines. The oil, heated by steam coils in the cars and by 80 kw of supplementary heaters, was vacuum treated to remove volatized water and gases. Spray nozzles and vacuum pumps on the 8,000-gal storage tank made it a second stage of this precess. Oil quality was continuously monitored by water-in-oil meters as it filled the pipe line at 470 gal per hour. Tests at remote end showed 0.6% pf and dielectric strength in excess of 35 kv.

Oil handling by Philadelphia Electric Co depends more on supplier certification and delivery in sealed containers, reported R. A. Horenberger. But dielectric tests verify its condition, and truck-mounted equipment provides field treatment when required. Four distinct oils are used, ranging from viscous compound for 33-kv solid cable to transformer oil in some other types.

Tests Verify Transformer Oil Theory

Intensified research in the production of insulating oil has proved that best qualities are produced by sulphuric-acid refining to a certain optimum point, claimed F. S. Oliver, Doble Engineering Co. But experiments are in progress to evaluate other refining methods. Important to this research has been development of a recording water-in-oil meter, an oxidizer, and other instruments and techniques for testing oil.

Recognition of the significance of this research appears in a statement by E. L. Raab, General Electric Co:

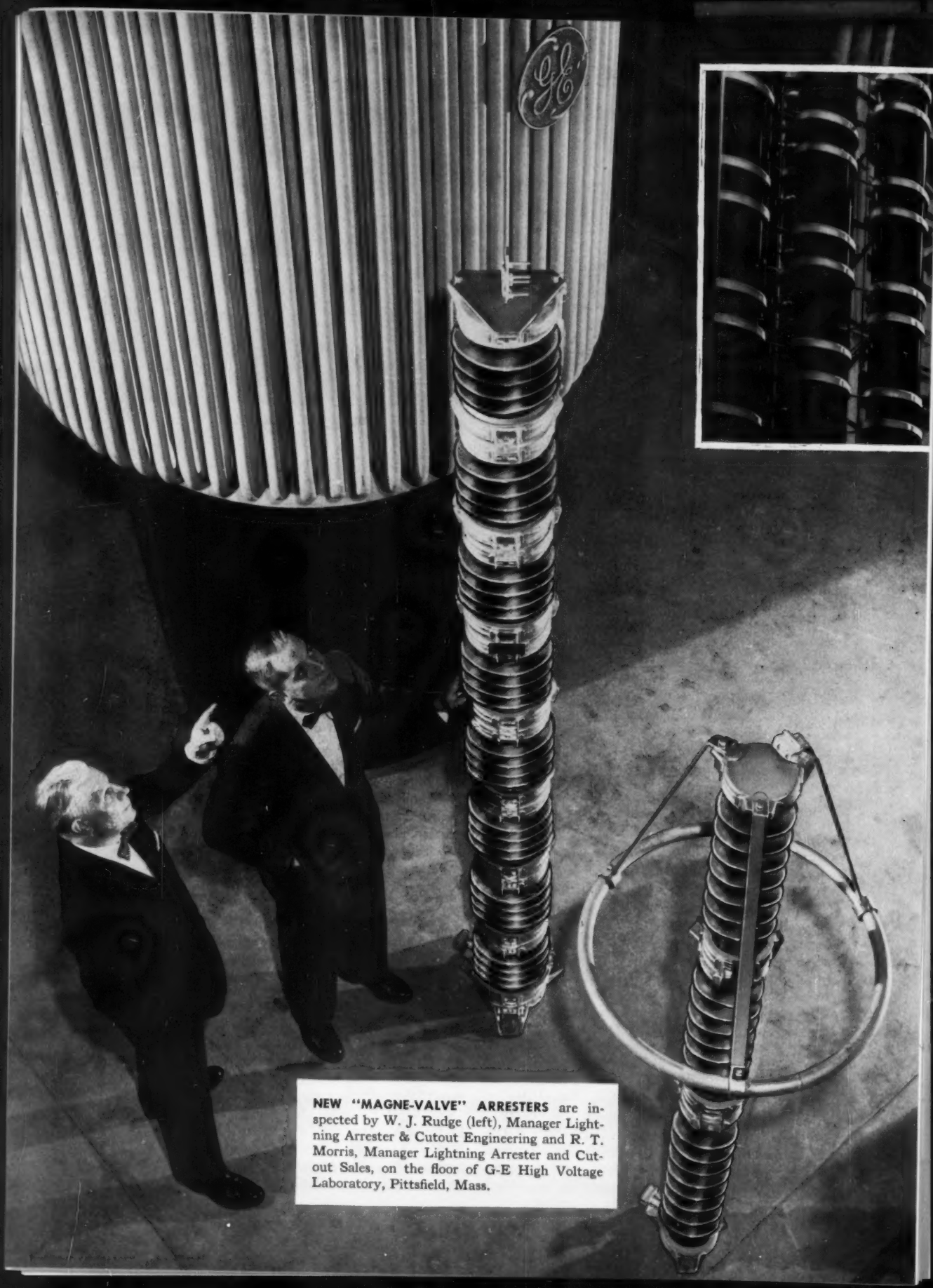
Arrangements have been made for interchange between the (GE) Transformer Division Laboratories Dept and Doble Engineering Co of representative samples of oil and test data obtained on oil samples. It is hoped to obtain better agreement on the characteristics of oil samples to minimize controversy over test data and to clarify statement of progress in obtaining a continuing supply of transformer oil adequate for existing and projected apparatus.

Esso Research will continue work on insulating oils, commented Robert Davern. But Doble can contribute knowledge of user needs and General Electric, advice about requirements of new equipment.

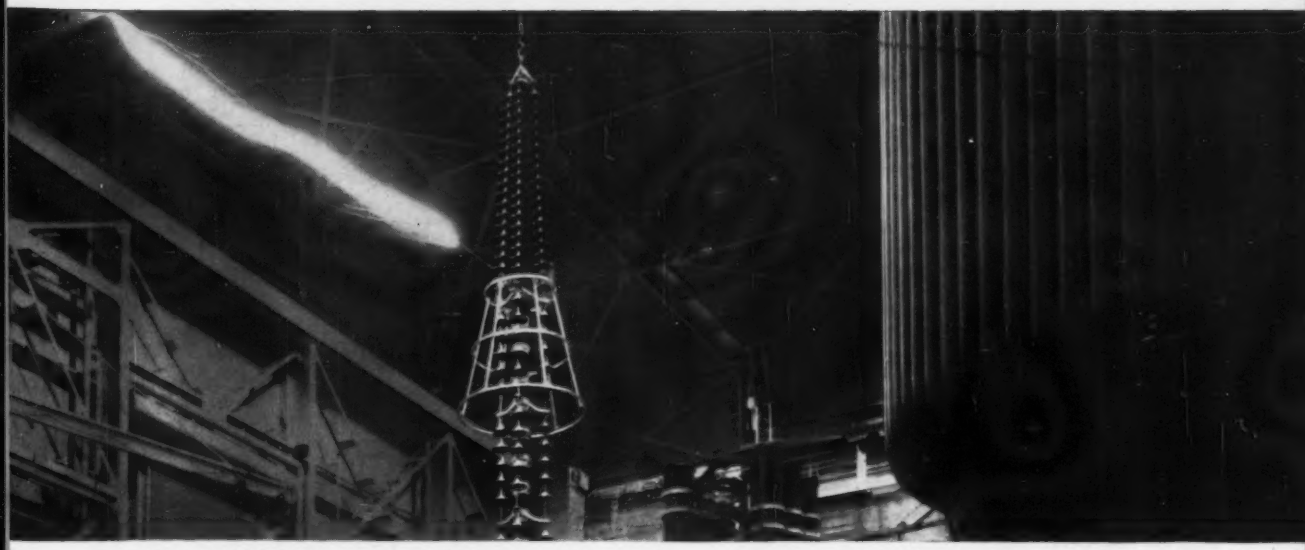
Research Licks Cable Failures in Water

Investigations disclose that dc voltage on certain insulated conductors immersed in water accelerates moisture penetration and can cause failure, reported R. C. Graham, Rome Cable Corp. But polyethylene seems immune and polyvinyl chloride or rubber compounds selected for long-time electrical stability resist this electro osmosis. Graham concluded that non-leaded cable can be made suitable for dc in wet locations.

Further reduction of insulation levels in large power transformers was predicted by Consultant P. L. Bellaschi. For 230-kv units he expects 750 BIL, down from 1,050 in 1936, 900 in 1946, and 825 in 1951. For 138-kv operation he foresees a drop from 650 to 450 BIL with eventual use of 92-kv bushings, and 115 kv will use 350 BIL and 69-kv bushings. Factory tests will represent lighting with surges up to 40 microsec, switching with 0.001 to 0.1 sec.



NEW "MAGNE-VALVE" ARRESTERS are inspected by W. J. Rudge (left), Manager Lightning Arrester & Cutout Engineering and R. T. Morris, Manager Lightning Arrester and Cutout Sales, on the floor of G-E High Voltage Laboratory, Pittsfield, Mass.



WORLD'S LARGEST ARRESTER—Thyrite* Magne-valve station-type arrester for 330-kv service defies repeated 7,500,000-volt strokes.

Out of this G-E laboratory came Magne-valve

Paving the way for Power Transformers insulated *two steps* down

Studies with 15,000,000-volt man-made lightning strokes continually yield new knowledge of lightning phenomena at General Electric's High Voltage Laboratory at Pittsfield, Massachusetts. Largest of its kind in the world, this laboratory is an outstanding reason why General Electric constantly sets the pace in producing new advances in lightning protective equipment.

Latest of these advances is a new line of station- and line-type arresters giving an unprecedentedly wide margin of protection—far beyond that of any other equipment of this type yet offered.

The reason is the exclusive "Magne-valve" principle developed in the G-E High Voltage Laboratory—a combination of *magnetic* action of series gaps and *valve* action of improved Thyrite disks.

"Magne-valve" gives as much as 20% more protection. In addition, you get three times greater discharge capacity, better ability to withstand high lightning currents, multiple strokes and long duration discharges. This extra margin of protection makes an important contribution towards today's constant efforts to protect system investment and to improve service continuity.

Now, Magne-valve allows insulation *two steps* down. The development of Magne-valve station-type arresters with superior protective characteristics opened the door of research toward power transformers insulated *two steps* below "Full B.I.L." (Basic Insulation Level). The availability of these transformers with attendant savings in cost and space requirements has recently been announced to the industry.

For assistance in making your choice of Magne-valve arresters, call your local G-E Apparatus Sales office, or write for Bulletins GEA-1304 (New Station Arrester) and GEA-2978 (New Line Arrester). General Electric Co., Schenectady 5, N. Y.

* *Reg. Trade-mark of General Electric Co.* 432-16

Progress Is Our Most Important Product

GENERAL ELECTRIC

'56: Wiring's "Fix Up" Year?

Giant all-industry movements to get folks to modernize their homes this year promises to be big help to wiring's cause

The industries that supply materials for building and modernizing the nation's homes are making 1956 their big year for "fix up."

The promotion campaign has taken on the drive and organization of a military mission. Operation Home Improvement, a giant inter-industry movement, recently laid out its own plans for the year in a conference in Washington that received speeches from top government officials and a proclamation from President Eisenhower. The goal: Generate $15 billion or more of home improvement and additions this year.

The electric industry is doing its part. Edison Electric Institute has announced a national "House Power" promotional campaign to push rewiring of homes (EW Jan. 16, p 10), complete with a $100,000 contest to begin in May. The institute figures that some 20-million homes are short on wiring, and figures cost of up-wiring at some $4.9 billion.

Merchandizers of electrical home appliances are a big moving force in the home improvement drive, along with suppliers of building and plumbing materials. Sears Roebuck & Co began promoting through its nationwide stores the fix up story—concentrating on appliances, and do-it-yourself materials.

Housing Administrator Albert M. Cole told the OHI conference in Washington that over 10 million homes will receive substantial improvements during 1956 at a cost of over $9 billion. And, he says, an additional million homes will receive maintenance and repairs in excess of another $5 billion.

The U. S. Chamber of Commerce sees this kind of a market: Of the 48 million dwelling units in the country, some 43 million are worth maintaining, or restoring or improving. And the Chamber says some $20 billion a year is the cost of keeping these homes in good repair. The Census Bureau says that in 1955, retail sales of household appliances and furniture jumped to slightly over $10 billion in 1955, and the guess of optimists in the home improvement movement expect as big or bigger year for 1956.

The administration is going to ask Congress to liberalize existing housing laws to assist the home improvement program. The President recommended such liberalizing in his state of the union message, without specifying any particular legislation. But it is expected he will later ask the Federal Housing Administration for authority to guarantee improvement loans up to $3,500 for as long as five years. Present law limits these loans to $2,500 for three years. In any case, local banks have to participate in the loans, up to 10%.

AW Conference Set for Chicago, Feb. 23-24

Industry wiring programs during 1955, and plans for 1956 will be discussed at the twelfth annual Adequate Wiring Bureau Conference at the La-Salle Hotel in Chicago, Feb. 23-24.

"Adequate Wiring Promotion—1956: A New Look" will be presented in three parts and will consist of the National Adequate Wiring Bureau's program for 1956, the program of the Edison Electric Institute, and those of individual manufacturers.

Electric Heating Called Rural Boon by Maker

Electric heating soon will provide the solution to one of the most pressing problems now confronting rural area electric power suppliers—summer loads.

This was the opinion voiced by Stanley B. Aronson of Berko Electric Manufacturing Co at National Rural Electric Cooperative Association convention in St. Louis Jan. 25. Said Aronson: "You can be certain that in five years virtually every power supplier will have a major summer load."

"Heatless" Range Shown in "Kitchen of Tomorrow"

Frigidaire Division of General Motors Corp rolled out its newest "Kitchen of Tomorrow" at GM's "Motorama" premiere in New York last month. As usual it was loaded with innovations that may be forerunners of things to come. Samples:

- A device that washes dishes with sound waves.
- A range that cooks without getting hot.
- An oven with a glass dome.
- A "magic" recipe maker.
- A remotely controlled serving cart.
- A television telephone.
- A hot and cold beverage dispenser.
- A refrigerator that can be loaded by a delivery man outside the house.

The "heatless" range consists of a marble countertop with induction heating units concealed below. It will boil water in a matter of seconds without heating the marble. Also featured was a self-rinsing sink with a power-driven "pot scrubber."

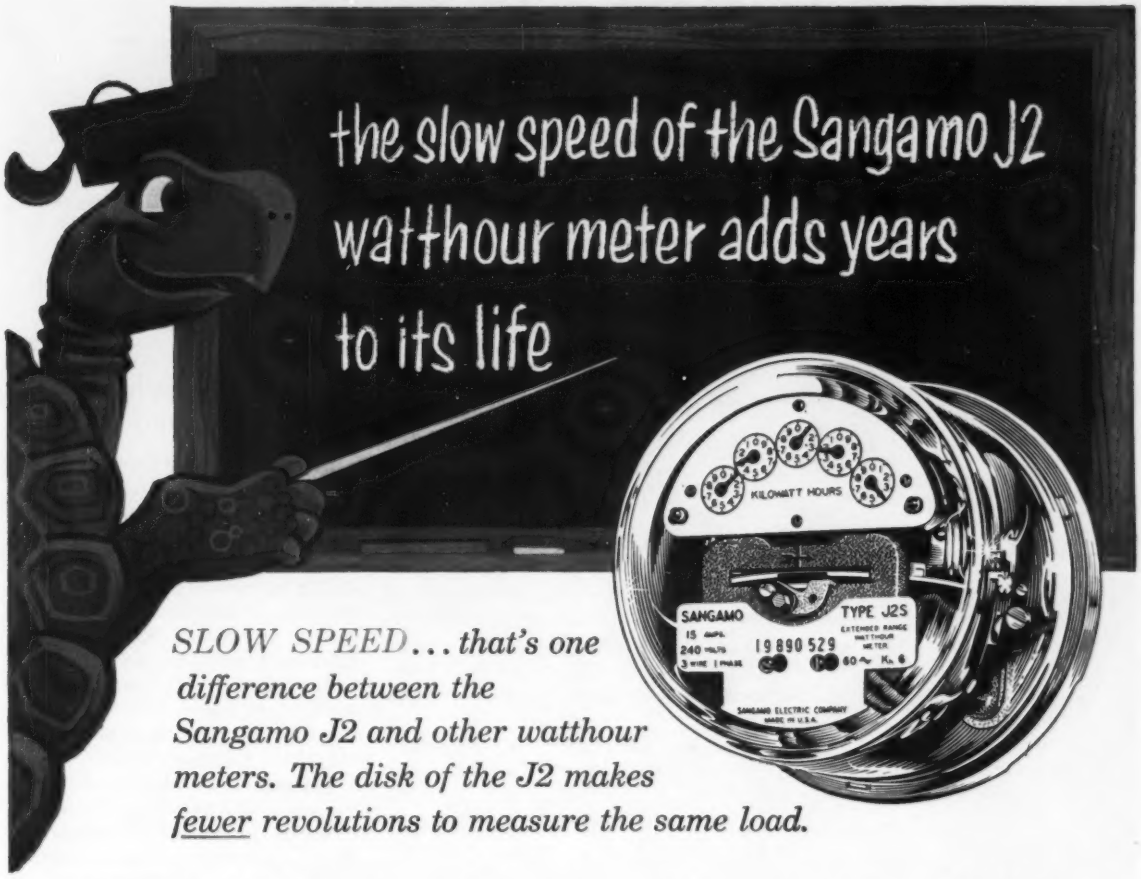
S&S SHORTS

Cincinnati G & E Cited

Cincinnati Gas & Electric Co and the Cincinnati Post have been given special awards for their "distinguished contribution to the industry campaign to promote the sale of automatic electric dishwashers." Presented by the Household Sinks Section of the National Manufacturers Association, the awards were made Jan. 19 in Chicago. It was CG&E and the Post which last summer carried out NEMA's "test city" dishwasher promotion (EW, July 25, 1955, p 136).

Freezer Promotion Kits Ready

Promotional materials for Edison Electric Institute's forthcoming food freezer campaign are now ready. To carry the theme, "Freezer Living Is Leisure Living," the campaign will extend through May, June, July, and August. Deadline for ordering materials is Feb. 24 with bulk shipments going to utilities March 16.



SLOW SPEED... that's one difference between the Sangamo J2 and other watthour meters. The disk of the J2 makes fewer revolutions to measure the same load.

What the J2's fewer revolutions mean in terms of one year's time...

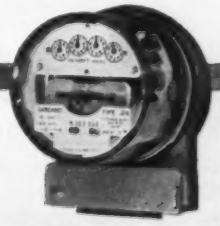
The disk of the J2 revolves 166⅔ times to measure one kilowatt hour. Other meters make 277.7 revolutions to measure a kilowatt hour.

This year's average residential load will be approximately 3000 kilowatt hours. If you multiply this figure by 277.7, you get 833,100 —the number of revolutions a 3.6 constant meter makes in measuring 3000 kilowatt hours.

When we multiply 3000 kilowatt hours by 166⅔, the speed of the J2, we get 500,000. The difference between 500,000 and 833,100 is 333,100. In other words, the J2 makes 333,100 *fewer* revolutions in a year's time to measure the same load! 333,100 *fewer* revolutions to cause wear on moving parts. Think what it would add up to in 30 years!

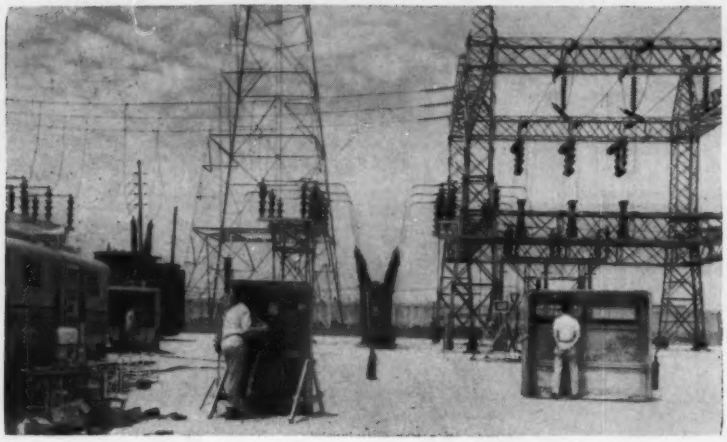
That's why we say "the slow speed of the Sangamo J2 adds years to its life."

JM56-1



SANGAMO ELECTRIC CO.

SPRINGFIELD, ILLINOIS



Chance Co Tests Cutout Designs

Included in A. B. Chance Co's engineering procedure is field testing of new cutout designs to check progress of development work. Here is shown Chance's mobile test laboratory on test location at a Kansas City Power & Light Co substation in Kansas City, Mo. At this site cutout engineers of the Chance Product Engineering division completed tests recently on a new open-type drop-out cutout to be announced soon.

Slow motion movies were taken of each test. These tests become a part of a permanent test record along with the test reports recorded in the central section of the laboratory.

Brushmaster Reports Export Sales Up 315%

Brushmaster Saw Co, Keene, N. H., reported recently that export sales of its brush-cutting machine in 1955 soared 315% over the 1954 figure. The firm's domestic sales were up 52% over 1954, stated Stuart G. Bowren, president.

The portable, gasoline-powered, brush-cutting machine, known as Brushking, had sales in 12 countries. One European firm bought nearly 500 machines and formed a Scandanavian Brushking service center.

The machine reportedly enables one man to do the work of six using axes.

Resistance Welder Firms Record Top Year in 1955

Resistance Welder Manufacturers' Association recently pointed to 1955 as an excellent year for its members. New business showed an increase of nearly 33% over orders received during 1954. Shipments for 1955 were up almost 10% above 1954.

Members of the Association received more than $36 million in new orders and shipped more than $31 million of equipment during 1955. These companies reported about $12 million in present orders on hand at the beginning of 1955.

Aluminum Association Elects Top Officers

Officers of the Aluminum Association were elected at the group's recent annual meeting in New York, N. Y. Election is for service in 1956.

Arthur V. Davis, chairman of the board of Aluminum Co of America, was re-elected chairman of the board of the Association. Everett G. Fahlman, president of Permold Co, Medina, Ohio, was re-elected president of the group.

Re-elected directors-at-large to serve three-year terms were: Archie P. Cochran, president of Cochran Foil Co, Inc, Louisville, Ky.; and John W. Douglas, president of Republic Foil & Metal Mills, Inc, Danbury, Conn. C. A. Macfie, president of Revere Copper & Brass, Inc, New York, was elected to serve three years as director-at-large.

Canadian Manufacturers Propose Lighting Bureau

Decision to form a Canadian Lighting Bureau was made at a recent meeting of some 45 Canadian lamp and fixture manufacturers.

Main object of the proposed bureau will be to promote better lighting with the aim of increasing the Canadian market for lighting equipment. The Canadian Lighting Bureau will attempt to correlate activities carried on in the U. S. by Edison Electric Institute, National Lighting Bureau, and American Home Lighting Institute.

Representatives attending the meeting appointed a ten-man organizational committee to establish the bureau and to recruit members from companies engaged in the lighting field. Committee chairman is B. A. Wilson, vice president of J. A. Wilson Lighting & Display, Ltd. Toronto.

Silver-Cadmium Battery

Development of a silver-cadmium battery was announced recently by Yardney Electric Corp. The New York firm said the unit was designed to meet exacting space and weight requirements. The battery, when using a six-amp-hr cell, has filled weight (including electrolyte) of 4.95 oz, volume of 5.05 cu in., 1.25 v maximum, and 1.1 v working.

EERA Officers Elected

Electrical Equipment Representatives Association recently elected the following officers to serve in 1956; President—Edward W. Verbarg of Bergstrom-Verbarg Co, Minneapolis, Minn;

(*Continued on page 59*)

Use 'em for every conductor combination

KEARNEY SERV-ENS

SERVICE ENTRANCE SLEEVES

Between the two bores of each Serv-En is a solid metal barrier that acts as a "spacer" to prevent galvanic action. Also, the bores contain KEARNALENE corrosion inhibitor. Your crews can use KEARNEY Serv-Ens for connecting all combinations of ACSR, aluminum and copper conductors. Plastic caps on each end of the sleeve are color-coded for quick size identification. In addition, each sleeve is plainly marked with its size range and conductor cut-off length.

JAMES R. KEARNEY CORPORATION • 4224 Clayton Ave., St. Louis 10, Mo. • *Canadian Plant:* Guelph, Ont.

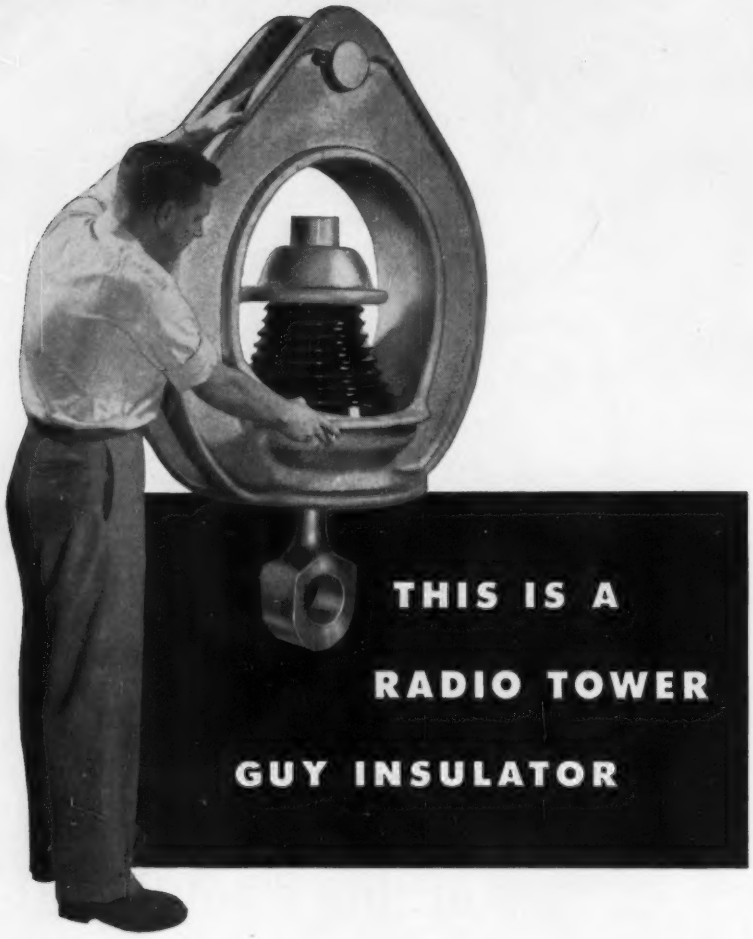
329

for BETTER CONSTRUCTION
SAFER MAINTENANCE
Specify

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. GUELPH, ONT.

The Mark of Quality

KEARNEY PRODUCTS



This is probably the largest and strongest strain insulator ever made. It is one of an order for 50 such units to be installed in guys for a giant transmitter antenna. Weighing 1340 lbs., it is to be used with a 2¼" steel strand cable, and is designed to break the cable before failure of the insulator—frame or porcelain.

Most of the world's vertical radiators for radio transmission are insulated by Lapp units—both footing and guy insulators . . . which Lapp originated and have produced in considerable volume for nearly 25 years. All have incorporated the Lapp porcelain "compression cone," a design which utilizes to fullest extent the enormous strength of porcelain in compression. When properly mounted, Lapp porcelain attains a compression strength in excess of 100,000 lbs. per square inch.

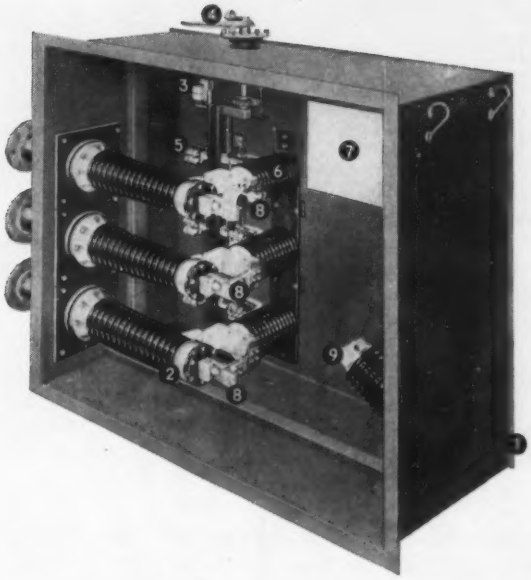
But basic to such strengths is "proper mounting." In Lapp radio insulators, proper mounting means external attachment of hardware, a design conception which provides that thermal changes between parts, as well as external loading, load the porcelain in compression.

External attachment of hardware, you'll notice, is also the design conception of the Lapp Line Post and Station Post, and a reason why these insulators so greatly outperform multi-part internally-attached-pin insulators.

This is one of the things we mean when we say that Lapp has an understanding of porcelain, its virtues and its strengths as well as its limitations . . . and an ability to design and produce assemblies that assure greater operating security, longer life, lower upkeep.

Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp



69-Kv Grounding Switch

This 69-kv oil-filled grounding switch is designed for direct welding to a 2,000-kva secondary network transformer. It is one of five switches manufactured by G&W Electric Specialty Co and shipped recently to Consolidated Edison Co of New York, Inc. The transformers will serve the Galbraith Building now being constructed on 42nd St, New York.

The Chicago manufacturer stated that the switch is designed to connect the transformer to three single-conductor, 250-Mcm, 69-kv, medium-pressure, gas-filled cables. Another purpose, G&W said, is to ground the feeder cables and primary side of the transformer. (See item 5 on illustration.)

The heavy-duty switch contacts withstand current of 40,000 amp momentarily and 35,000 amp for four sec. They are electrically interlocked to prevent closing the switch while the transformer is energized.

The switch includes oil-filled potheads with semi-stop glands for the three single-conductor gas-filled cables.

1. **Grounding switch case welds to transformer tank.**
2. **Feeder pothead.**
3. **Electrical interlock.**
4. **Handle to shaft holding movable grounding contacts for each phase.**
5. **Grounding contacts on shaft swing 90-deg to stationary contact (not visible) on solid fitting on supporting insulator, grounding feeder and transformer primary leads.**
6. **Supporting insulator.**
7. **Opening for transformer h-v bushings.**
8. **Connectors for transformer primary leads.**
9. **Insulator support for transformer lead to lower pothead.**

(*Continued from page* 56)

Executive Vice President—Malcolm F. Knaus of Knaus-Glaser-Bowman & Henry, Detroit, Mich; 2nd Vice President—J. E. Murray of J. E. Murray & Co, Kansas City, Mo.; Treasurer—C. B. Anderson of C. B. Anderson Co, Tulsa, Okla.; Secretary—Marvin R. Horne of George R. Horne & Co, Dearborn, Mich. F. E. L. Whitesell, Winter Park, Fla., will continue as executive secretary in 1956.

Complete New DC Motor Line Announced by GE

A new line of direct-current drive equipment is now obtainable from the General Electric Co. Known as the Kinamatic line, it is reported to be the first complete line of industrial dc motors and generators built to the latest NEMA standards.

This new line includes motor ratings from one to 150 hp, and generator ratings from 0.75 to 100 kw. An average of 33% increase in horsepower per pound has been achieved. And across the line, there is an average of 25% reduction in weight per horsepower.

P. D. Ross, marketing manager of GE's Direct Current Motor and Generator Department, said that the Kinamatic motors have been designed for exceptional versatility and may be used in either constant or adjustable speed applications.

Designed specifically for use in automated processes the new motors and generators, according to Ross, are engineered to meet industrial needs for faster, more continuous and more automatic production. This dc equipment, he said, provides adjustable speeds and an adaptability to feedback and programming controls so vital to automation. Split second response is reported for quick stops and starts and fast reversals.

The standard dc motor has a rolled steel frame with cast iron dripproof end shields. Split, cast iron, waterproof conduit boxes are available in three sizes for each motor frame.

In anticipation of greatly increased demand for dc motors and conversion equipment, Ross pointed out that the Department is developing more than a million square feet of manufacturing capacity at the Erie, Pa., Works.

M & M BRIEFS

Selas Corp of America has moved from its Philadelphia site to a new plant at suburban Dresher, Pa. The firm develops, designs and manufactures automatic heat-treating, brazing, melting and other heat-processing equipment.

Texas Instruments, Inc, Dallas, Tex., recently announced purchase of business and assets of Burlington Instrument Co, Burlington, Iowa. The latter, manufacturer of electrical indicating instruments, will transfer all operations to Dallas.

Daystrom, Inc, now at Elizabeth, N. J., has purchased about 20 acres of land in Berkley Heights, N. J., as a site for a new executive office. Tentative plans include construction of an electronic research laboratory.

American Welding Society is revising its Welding Handbook. The new fourth edition will consist of five sections, one to be published each year. Each will have up to 500 pages and will be punched for binder insertion.

BUSINESS OUTLOOK

Electrical World
FEBRUARY 13, 1956

The outlook in brief: **There's no sign yet that the drop in auto output has brought much relief to the steel shortage.** In fact, chances are steel prices will rise.

February car production is running around 15% below last year's levels. For the first half of this year sales are expected to be down by at least 10%. There'll also be some inventory cutting, contrasted with last year's buildup. **Net, this could mean no more than 3.5 million cars produced before July or about a fifth less than last year.**

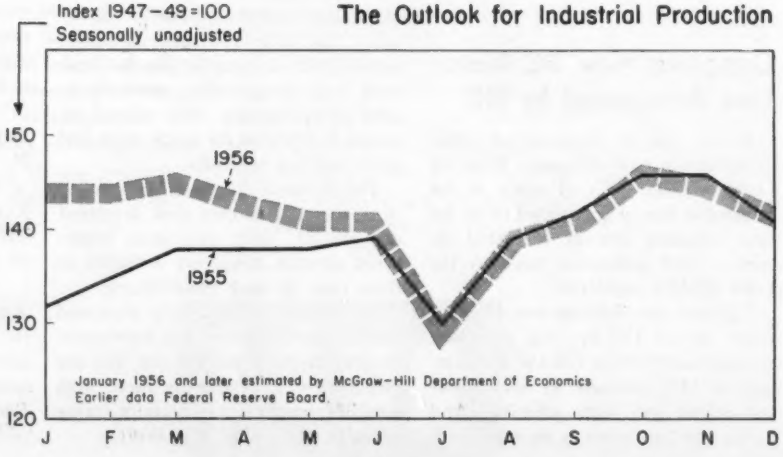
In a smaller, and less diversified, economy this could be deadly. It looks, though, as if we can take it in our stride. The saving grace is that **activity is rising in other fields:** business plant and equipment, defense and public works spending. Rising incomes generated in these fields will cushion auto declines.

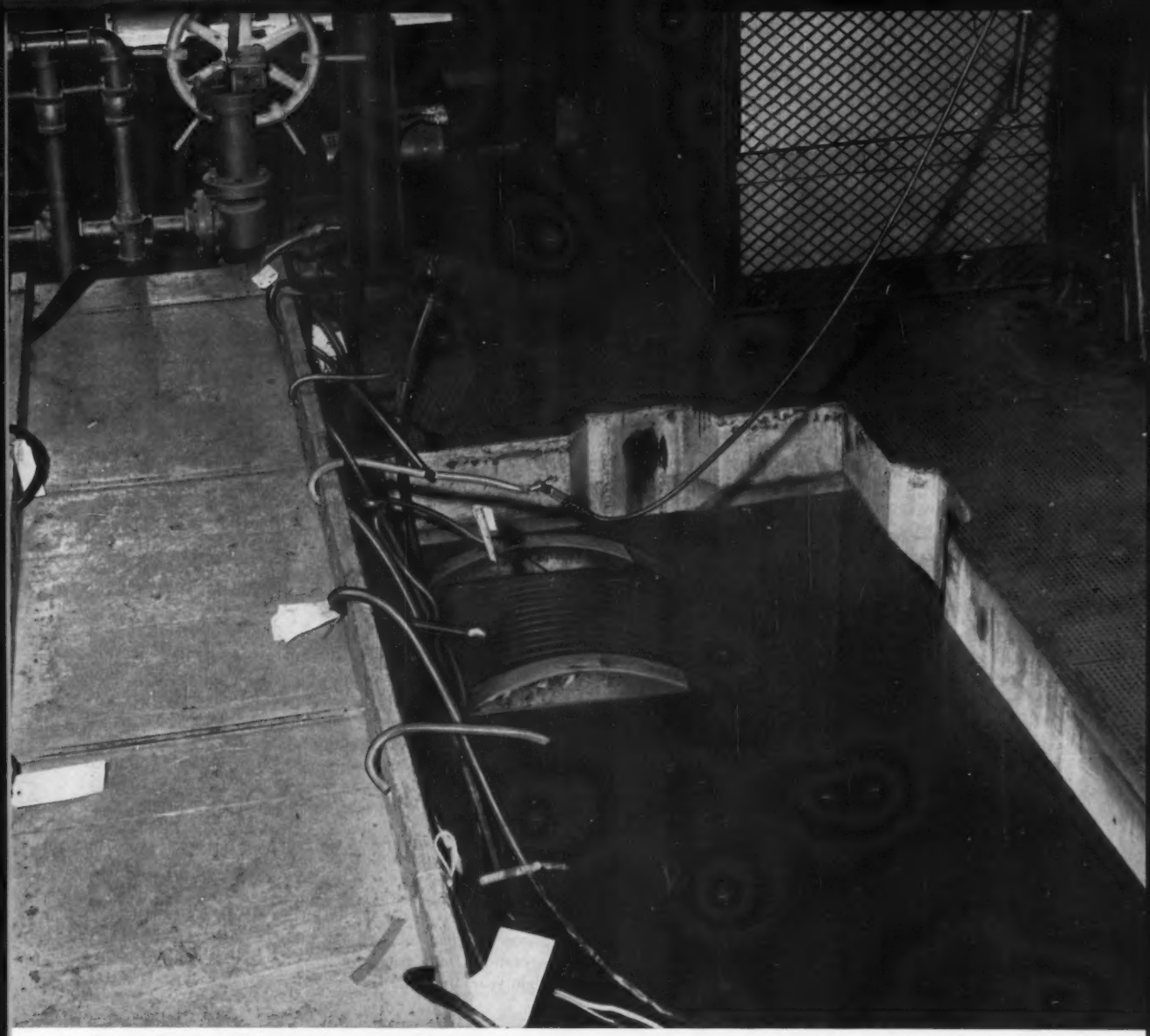
So far there's been no appreciable easing in the steel shortage. Weekly production has been nearing 2.5 million tons, exceeding rated capacity. **New orders for structural steel in December were 368,000 tons, compared to 197,000 a year earlier:** carbon plates and structural shapes are in particularly urgent demand. **The drive to build inventories goes on.** They're needed to get back to a healthier ratio to current sales. And there's considerable interest in beating out an expected price hike this summer, which will likely follow the next round of wage-increases. Some are even thinking in terms of a little extra insurance in case of a strike.

Realistically the outlook for relief comes from two quarters. Some steel released by auto cutbacks may find its way to other users. But sheet steel facilities must first be converted to plate. This isn't always possible, and in any case takes some time. **There's more certainty of relief from the new facilities coming into operation** in the next few months. **They should expand structural steel capacity by 10-12%.**

U. S. Steel has indicated it's thinking about some upward price adjustments soon. By next summer this trend should be marked, if the decline in autos is no worse than here assumed.

The Outlook for Industrial Production





Anaconda 15-kv cable is subjected to 106 kv — 33% above industry standards with d-c. And tested at 25% above industry requirements with a-c.

15-KV CABLE GOES

Skin diving at 106 kv

Anaconda Type AB butyl-insulated high-voltage cable is tested under water at 600% overvoltage to assure you peak performance.

The fact that two high-voltage cables may look alike does not mean they'll perform alike. At Anaconda, 15-kv cable is tested at 106 kv with d-c for fifteen minutes. This voltage is 33% *above industry standards with d-c.* And in addition, Type AB is tested at 25% *above industry requirements with a-c.*

Only a vastly superior insulation can stand such high test voltage, even though there is no defect in the cable.

For your assurance of maximum service, Anaconda butyl-insulated cables are designed to perform far beyond industry requirements — in every important electrical and physical property.

New Engineering Bulletin EB-27 gives you full details on performance of Type AB insulation in 15 Industry Specification tests. Ask the Man from Anaconda for your copy. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 56294

Get all the facts on Anaconda Butyl. Write today —

SEE THE MAN FROM ANACONDA®

pioneer in **BUTYL INSULATION**

Santee-Cooper Probe Report Due Soon

Investigation by special state committee has sought answers on the financial status and management methods of the state power agency in series of hearings

The special committee looking into the affairs of the South Carolina Public Service Authority (Santee-Cooper) may offer its report to the legislature any day now. In general it is expected to deal with two broad questions:

1. What is the real financial condition of the agency?
2. Has management of the agency been prudent?

Originally proposed by former Gov James F. Byrnes in his farewell address, the investigation is the result of serious questions raised in the state as to the financial solvency of the agency. At the time he proposed the probe, Gov Byrnes reported he had been told that the agency would have a deficit of $750,000 at the end of 1955 fiscal year.

Co-op Contract Is Questioned

State Sen R. M. Jefferies, general manager of Santee-Cooper, claimed in recent hearings that the agency showed a net income last fiscal year of $264,000. However, he acknowledged that the agency had faced financial difficulties brought about by the severe drought that hampered hydroelectric operations and by low estimates for a steam station. These situations, he testified, forced the agency to take stringent economy measures. It also forced the agency to sell certain assets such as timber and land and to defer payment on a federal loan guaranteed by Santee-Cooper.

This loan, made in 1948 by Rural Electrification Administration to the South Carolina Central Electric Power Cooperative, drew considerable attention from the investigating committee. Under terms of the contract made possible by the loan, Santee-Cooper leases and operates a $13-million transmission network supposedly owned by the federated cooperative. The contract is for a term of 35 years and provides also that Santee-Cooper is to deliver power to member co-ops for 6 mills per kwhr. At the end of the contract period, Santee-Cooper is to take over the transmission system. The contract rate has since been temporarily raised to 6.4 mills per kwhr.

Do Rates Cover Cost of Service?

A key question to be answered by the special committee is whether the rate charged to the co-op members of Central Electric really cover the cost of service. Close observers of the situation surmise that not even the temporary rate is sufficient to cover the cost of service. They believe that rates sufficient to cover costs might run nearer 7 mills.

If such should be the case, then it may be that the state agency will be forced to seek a revision of the contract.

However, if Santee-Cooper rates to the co-ops climb very much, they will be above the rates of privately owned electric companies serving the same areas. This would mean that the co-ops would be paying a premium just to be served by a state agency to which they have committed financial support.

This possibility was raised at the time the REA loan was made to the transmission cooperative during the Truman Administration. At that time it was brushed aside by Jefferies and federal officials who were anxious to push through the loan.

The report of the special investigating committee, if it chooses to deal fully with this aspect of the Santee-Cooper operations, may come up with an answer. But it will be eight years too late.

TECHNICAL NOTES

Automatic voltage regulation of a small industrial-plant generator operating in parallel with a utility, if set slightly above normal supply voltage, will tend to maintain a high kvar output as long as the systems are tied. System separation then imposes only a small voltage boost on the industrial system to the value set on the regulator.

Duplication of power plant auxiliaries depends for justification upon evaluation of the added investment vs their contribution to reliability vs the cost of a forced outage.

Hurricanes seem to breed on heat from the ocean's surface. Seasons of weak trade winds carry away less ocean heat, leaving more of it to brew violence into hurricanes. Surmising that Gulf Stream velocity in the Florida Straits reflects trade wind influence on Caribbean waters, Western Union seeks to measure it by continuously recording the emf it generates in crossing the earth's magnetic field and thereby assure advance warning of conditions conducive to hurricanes.

Over capacity in a constant-speed boiler feed pump can cut plant efficiency and boost maintenance requirements for the feedwater regulator.

Serious overloading can follow load reduction on a cable of critical length because the lagging kvars of the load are inadequate to offset the high charging current.

Atomic wastes can be safely discarded into the ocean or buried in the earth if they are first mixed into clay which is then baked into bricks and glazed to seal out water.

Southern Nevada Power Rates Hiked

- **Nevada PSC grants company $727,843 a year increase in revenues**
- **PSC says this boost in revenues will mean a return of about 6.7%**

Southern Nevada Power Co has been granted a rate increase of $727,-843 a year by the Nevada Public Service Commission.

The background of the current rate proceedings dates back to Mar. 14, 1952, when, at that time, the PSC said: "'The company must make immediate arrangements for the necessary power generating capacity, either steam, gas or diesel, and have it ready to put on the line within the next three years, which is the time estimated by both the company and others concerned that the present power output allotted to Southern Nevada Power Co will be completely utilized.'"

Power Supply Cited

In its current opinion, dated Dec. 14, 1955, the Nevada PSC, in highlighting the expected shortage of power from federal sources, said: "The company had been able to supply its customers with power purchased from Colorado River hydro-plants at Boulder (Hoover) and Davis Dams until two factors intervened: i.e., the decrease in water supply available for power generation due to lack of precipitation on the Colorado River watershed, and the tremendous load growth in the Las Vegas area, described by a witness as an 'explosive rate of growth' probably 'unequalled in any other part of the country'.

"Multiple problems were encountered by the company in keeping abreast of the growth in the area and at the same time maintaining its service. **Cheap hydro power was vanishing** (Emphasis supplied). Steam generated power was purchased from an Arizona company to the extent of seventy million kwhr during 1954, and for 1955 it is estimated the purchased steam generated power will amount to approximately 245 million kwhr."

The need for the company to have its power production facilities as well as the fact that these supplies will cost more per kwhr than the current sources of federal power led the PSC to state in its opinion that "The record indicates the company will cut in its own 44,000 kw steam plant at Las Vegas during December of 1955; that in 1956 it will continue to use Boulder Dam and Davis Dam hydro power, plus a substantial block of Arizona surplus steam generated power until its second unit of 60,000 kw capacity is completed and put on the line during February of 1957; that in February of 1957 the company will be in a position 'to take care of such requirements without buying power from outside the state'. It is inevitable that the cost of power generated in the steam electric generating plant will be higher than that which was purchased from either Boulder (Hoover) or Davis Dam authorities.

"Power from Boulder and Davis Dams was costing the company approximately 2¼ to 2½ mills per kwhr. Arizona surplus steam generated power cost the company approximately 6.1 mills and some of the hydro power recently purchased from Southern California companies cost as much as 7.5 mills per kwhr. The record indicates the cost of power generated in the new steam plant will be approximately 6.7 mills per kwhr."

Company Earned About 9%

As to the Southern Nevada Power Co's earnings, in the light of the prospective increases in plant, the commission said: "The 1953 annual report of the company submitted at the time the company was a transmission and distribution unit indicates a net plant in service value of $4,514,-000, upon which it was earning approximately 9%.

"The 1954 annual report indicates a net plant in service value of $6,-511,000, upon which it was earning approximately 10%.

"At the end of 1954 the plant investment was $8,837,441. To this was added $9,149,300, but an adjustment of $150,041 was made because of certain retirements of plant.

"The plant to be considered at this time then becomes $17,836,701, which should be reduced by $1,640,-000 estimated depreciation, or $16,-196,701.

"Applicant seeks an increase in rates of 15.23% over all, or detailed as to type:

Customers	*Percent*
Residential	17.9
Commercial	12.2
Commercial) Cooking) Water heating) Space heating)	20.0
Hotels and Amusement Enterprises	26.2
Nellis Air Force Base	23.0
Industrial	11.7
Public Authorities Clark County) Las Vegas) North Las Vegas)	3.7"

On the basis of the foregoing increases, the PSC found that the company would earn a return of 6.7% on the company's plant, the commission order stated.

The PSC also noted that "Each schedule as submitted in the application contains tax adjustment and fuel adjustment clauses. During the hearing the tax adjustment clause was withdrawn, and the fuel adjustment clause was taken from all schedules except LGS."

In its findings, the commission said: "We find that the record shows a net valuation of the plant as of Dec. 31, 1955 to be $16,196,701;

"that the utility operating income amounts to $1,088,653;

"that an average increase of 15.23% will produce a return of approximately 6.7%;

"that this return of 6.7% may be up or down depending upon the actual operation of the rate increase;

"that the tax adjustment clause be stricken in all schedules;

"that the fuel adjustment clause be stricken in all schedules except the LGS schedule;

"that rules and regulations be prepared and submitted for approval;

"that service standards for the use of company customers be prepared and submitted for approval;

"that a rate of return of 6.7% is reasonable and not confiscatory;

"that the term, contract demand, in schedule LGS be more definitely defined and inserted in tariff sheet when filed. . . ."

FINANCIAL BRIEF

Memphis, Tenn., Mayor Edmund Orgill, city commissioners and members of Memphis Light, Gas & Water Commission, representatives of three local banks, and Rudolph Smutny, senior partner of Salomon Brothers & Hutzler, are discussing a program for marketing upward of $130 million in revenue bonds. The funds to be received from the sale will be used to build a 750,000 kw steam plant.

NRECA Meeting

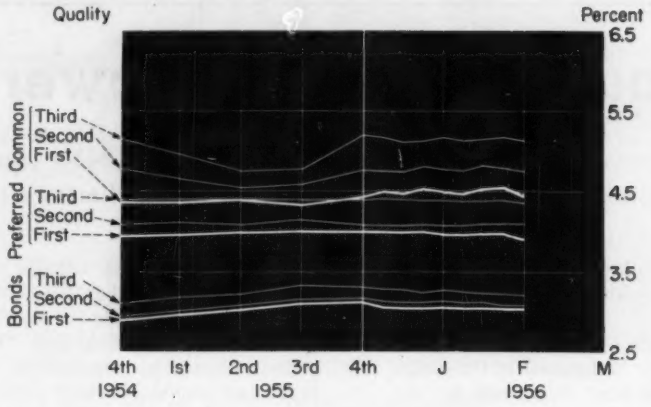
(*Continued from page* 37)

tax amortization benefits to private companies; Congressional approval of self-financing for TVA and, in the meantime, further TVA expansion funds; construction of federal fuel stations to firm up hydro capacity of all multi-purpose dams; and passage of the Lehman-Davidson bill for state development of Niagara River.

Congress was also urged to: strengthen the preference clause; build atomic power plants in the TVA and Bonneville Power Administration areas; investigate private utility industry; reconsider Holding Company Act in light of various joint utility company projects; and provide additional funds for co-op generation and transmission so that co-ops could have complete control over their entire operations including generation and transmission.

NRECA re-elected J. E. Smith president, Albert C. Hauffe secretary-treasurer, and John M. George, vice president.

Today's Utility Yields (%)



	BONDS			PREFERRED STOCKS			COMMON STOCKS		
QUALITY.....	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Feb. 2.....	3.04	3.09	3.20	3.94	4.09	4.38	4.49	4.75	5.11
Jan. 26.....	3.04	3.09	3.21	3.98	4.09	4.39	4.53	4.79	5.14

Utility Earnings

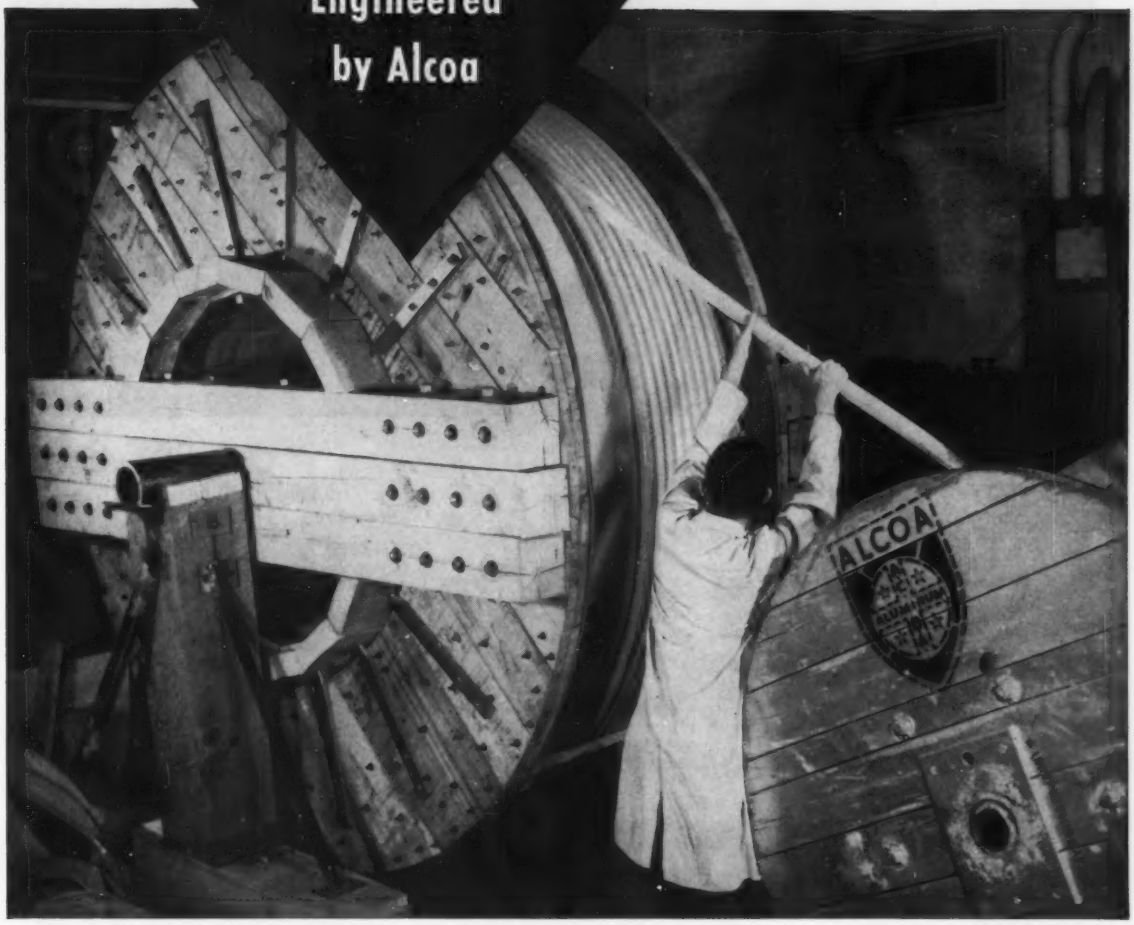
COMPANY	PERIOD MONTHS ENDED		NET INCOME 1955	NET INCOME 1954	EARNINGS PER COMMON SHARE 1955	EARNINGS PER COMMON SHARE 1954
Baltimore Gas & Electric.....	12	Dec.*	$14,075,000	$12,141,000	$2.11(a)	$1.95(a)
Central Vermont Public Service	12	Dec.*	1,364,219	1,362,344	1.24	1.27
Consumers Power.....	12	Dec.*	29,035,909	26,551,696	3.18(a)	2.95(a)
Long Island Lighting.....	12	Dec.*	11,064,950	9,242,126	1.41	1.29
New York State Electric & Gas.	12	Dec.*	10,631,041	9,382,952	2.71(b)	2.58(b)
Southern California Edison....	12	Dec.*	29,172,504	26,618,255	3.22	2.95

Notes—* Subject to year-end audit; (a) Based on average shares outstanding; (b) Based on 3,337,475 shares in 1955 and 3,034,068 shares in 1954.

Utility Financing

COMPANY AND DESCRIPTION	AMOUNT OF OFFERING (000)	OFFERING PRICE	YIELD TO PUBLIC
SCHEDULE FOR FEBRUARY—MARCH			
BONDS			BID DATE
Central Power & Light—1st mtg due 1986.....	$10,000	.....	Feb. 14
Dallas Power & Light—1st mtg due 1986.....	10,000	.....	Feb. 15
Kansas Gas & Electric—1st mtg due 1986.....	7,000	.....	Feb. 27
Texas Electric Service—1st mtg due 1986.....	10,000	.....	Feb. 28
Mississippi Power—1st mtg due 1986.....	4,000	.....	Mar. 1
Houston Lighting & Power—1st mtg.....	30,000	.....	Mar. 7
Alabama Power—1st mtg due 1986.....	14,000	.....	Mar. 15
Pennsylvania Electric—1st mtg due 1986.....	25,000	.....	Mar. 20
Georgia Power—1st mtg due 1986.....	12,000	.....	Mar. 29
PREFERRED STOCK			
Southern California Edison—1,200,000 sh cum $25 par	$30,000	.....	Feb. 14
Northern States Power—100,000 sh $100 par cum	10,000	.....	Feb. 29
Mississippi Power—40,000 sh.....	4,000	.....	Mar. 1
Louisiana Power & Light—70,000 sh $100 par.....	7,000	.....	Mar. 20
Pennsylvania Electric—90,000 sh.....	9,000	.....	Mar. 20
COMMON STOCK			
Southern Indiana Gas & Electric—83,030 sh (to be Offered commonholders on 1-for-11 basis, record Feb. 21 to expire Mar. 8).....	.....	.....	.....
Kansas Gas & Electric—200,000 sh.....	.....	.....	Feb. 27
Northern States Power—670,920 sh (to be offered commonholders on 1-for-20 basis, record about Mar. 1 to expire Mar. 20).....	.....	.....	.....

Mile Long 3,000,000 CM All-Aluminum Conductor Engineered by Alcoa



Your Guide to Aluminum Value

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA
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A mile of two-inch, all-aluminum cable is used for a 15,000-pound inductance coil in experiments now under way at the Engineering Research Institute of the University of Michigan. Capable of storing three million watt-seconds of energy, the coil was wound with cable that was specially engineered and produced by Alcoa for the university's study of the properties and applications of electric discharges.

The same Alcoa cable engineering and production facilities which solved the unusual technical problems of this project are at your service. They are the best staffed and equipped to handle your special conductor needs.

When you have a conductor engineering problem, call your local Alcoa sales office. Or write, Aluminum Company of America, 2306-B Alcoa Bldg., Pittsburgh 19, Pennsylvania.

ALWAYS USE ALCOA® ALUMINUM ACCESSORIES WITH ALUMINUM CONDUCTORS

STATISTICS

United States Production and Distribution of Electric Energy 1950—1954

(Thousands of Kwhr)

	1950	1951	1952	1953	1954
Generation (Net utility)	329,141,343	370,672,814	399,223,620	442,664,515	471,686,354
Generation (Industrial)	59,533,047	62,685,096	63,831,074	71,504,616	72,958,684
Net Receipts or Deliveries	2,107,490	2,616,164	2,897,659	2,769,396	2,894,869
Total Available	390,781,880	435,974,074	465,952,353	516,938,527	547,539,907
DISPOSITION:					
Industrials (Production used)	56,196,691	58,653,756	59,569,551	67,600,590	68,435,056
Used by Company	1,441,678	1,527,353	1,451,726	1,693,030	1,775,222
Furnished Without Charge	978,556	904,233	918,929	937,111	861,887
Losses and Unaccounted for	41,268,079	44,802,990	48,086,046	50,153,685	52,303,950
Total to Ultimate Customers	290,896,876	330,085,742	355,926,101	396,554,111	424,163,792
Residential	72,200,340	83,092,821	93,544,873	104,146,290	116,228,286
Commercial	52,090,634	58,642,957	63,934,953	66,532,672	72,141,108
Industrial	144,478,740	164,368,637	174,127,502	199,530,879	208,464,736
Other	22,127,162	23,981,327	24,318,773	26,344,270	27,329,662
Total Electric Utilities	334,585,189	377,320,318	406,382,802	449,337,937	479,104,851

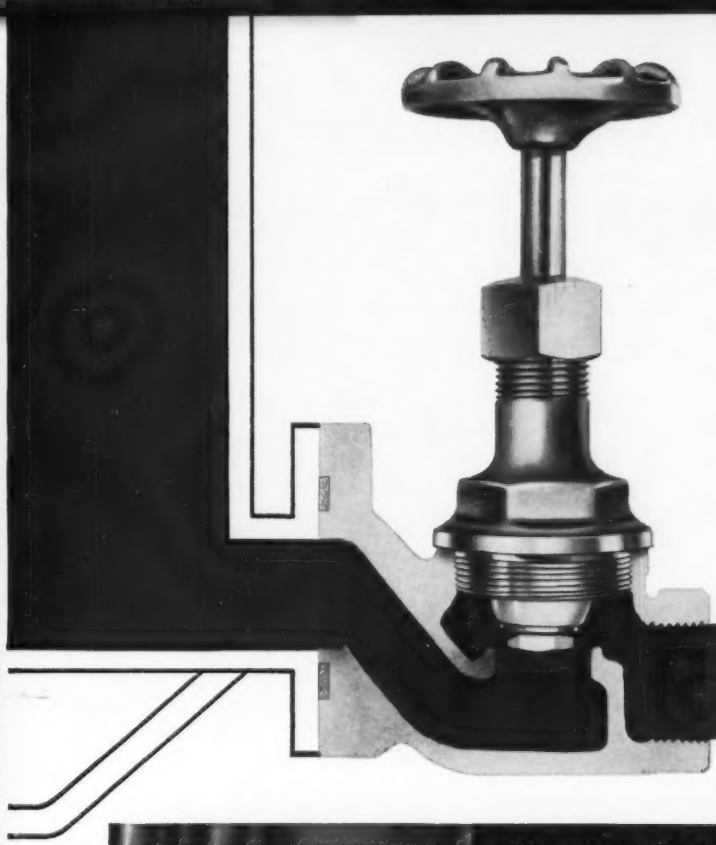
Source: Federal Power Commission

Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	Nov.	113.55	112.13	101.11	12.3
Peak—Class I Systems (million kw)	Nov.	96.4	90.6	*82.0	17.6
Estimated Dec. '55 Peak (million kw)	Nov.	97.44	96.72	96.07	1.4
Estimated Dec. '56 Peak (million kw)	Nov.	104.55	104.34	102.71	1.8
Production—billion kwhr	Nov.	47.76	47.37	40.21	18.8
Hydro		9.21	8.77	8.11	13.6
Fuel		38.54	38.60	32.10	20.1
Sales—billion kwhr	Nov.	43.07	43.16	36.29	18.3
Residential		10.71	10.33	9.72	10.2
Commercial		6.61	6.87	6.08	8.7
Industrial		23.37	23.45	18.26	28.0
Other		2.38	2.51	2.23	6.7
Fuel Consumption	Nov.				
Coal—million tons		13.29	12.70	10.70	24.2
Oil—million barrels		7.10	6.04	5.82	22.0
Gas—billion cu ft		82.26	104.75	88.40	−6.9
Net Income Class A & B Co's—$ million	Nov.	104.29	95.67	95.12	9.6
Residential Customers—millions	12 mos.	44.30	44.21	43.04	2.9
Revenue per kwhr	ended	2.65¢	2.65¢	2.70¢	−1.9
Avg kwhr per customer	Nov. 30	2,728	2,715	2,529	7.9
Avg annual bill		$72.29	$71.95	$68.28	5.9

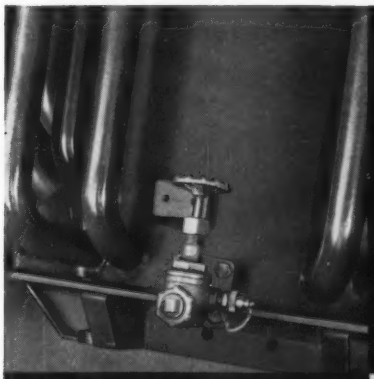
Business Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Indexes: 1947-49 = 100					
FRB Industrial Production	Dec.	141	146	128	10.2
ENR Construction Cost	Dec.	141.1	141.1	134.7	4.8
BLS Cost-of-living	Dec.	114.7	115.0	114.3	0.3
NEMA Sales	Nov.				
Insulation materials		155	156	124	25.0
Electric appliances		88	96	71	23.9
Wholesale prices	Dec.				
Motors and generators		127.2	127.0	121.8	4.4
Transformers and regulators		129.2	129.2	128.1	0.9
Switchgear and fuses		145.9	145.9	135.3	7.8
GNP—annual rate—$ billion	3rd Qtr.	392.0	384.8	358.8	9.3



MOLONEY SAYS... DRAIN 'EM... SLIDE 'EM

Drain valves to drain out *all* transformer oil, and sled-type bases to ease installation and moving problems are but two of many plus features on Moloney Substation-type Distribution Transformers. Products of Moloney research, Moloney plus features are designed to benefit your utility in every way, adding up to better overall performance and long lived dependability.



All the oil drains freely with Moloney's new oil valve because the valve's seat is ⅛" below the transformer tank's bottom. The nylon-brass valve seat makes a positive seal, preventing oil leaks. But that's not all. The new drain valve actually requires less floor space since Moloney's compact new valve doesn't project out as far. Leaky pipe threads are eliminated, too, because the new drain valve *bolts* to a heavy flange that's sealed by a corprene gasket confined in a gasket retaining groove.

Sampling valve, mounted high on the valve body, has free access with plenty of space for the sampling cup, and operates only when drain valve is open.

It's easy to slide a Moloney Substation-type Distribution Transformer on its new sled base because its steel runners slide freely in any direction . . . and over any surface. Developed by Moloney engineers, the new sled base weighs less than former bases . . . yet it's actually stronger because it's made from steel channels. Continuous welds prevent corrosion at joints. Holes in base members provide ventilation, preventing condensation and corrosion.

Gussets strengthen base plate corners for jacking. Holes in each gusset make it easy to pull or guide transformers from any side. Corners of the new sled base are open, too, allowing plenty of space for jack clearance.

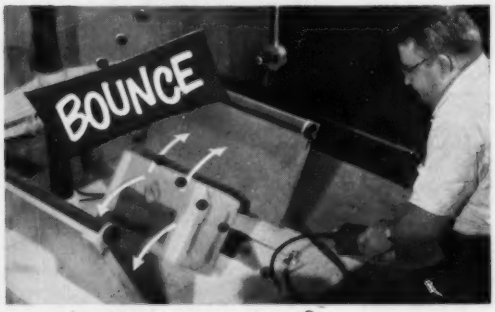
MOLONEY ELECTRIC COMP

Power Transformers • Distribution Transformers • Load Tap Changing Transformers
Regulating Transformers • Step Voltage Regulators • Primary Unit Substations • Secondary Unit Substati
Transformers • Network Transformers • Series Street Lighting Transformers • Subway Transformers
Industrial Dry Type Transformers • Capacitors • Magnetic Components for Electronics

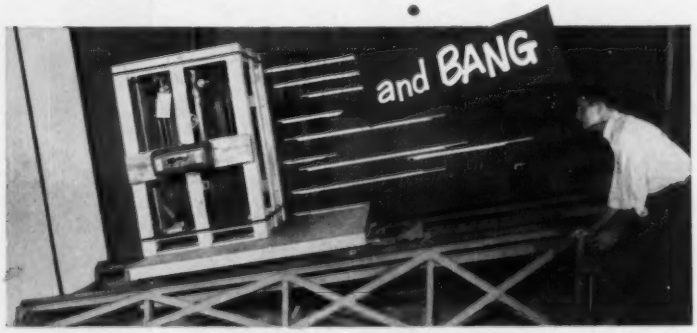
SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO. AND TOR[illegible] ONT., [illegible]NADA

NEW Transformer Obstacle Course

On this vibrating table, crated distribution transformers are tested for railroad car and truck vibrations. Equipment simulates varying speeds, irregularities in road or track, and natural frequency of truck springs.



Hinged platform drops packaged instrument transformers to steel plate from various heights. Package is positioned at desired angle of impact to test all edges and faces.



Impact test is equivalent to free drop to ground from back of truck or railroad car. Packaged unit slides down incline from a release point selected to produce impact equivalent to 9 G's . . . nine times acceleration of gravity. Shock recorder on crate measures initial impact.

Assures Safe Shipment by Pretesting Package Design

At Allis-Chalmers, quality control doesn't end until the transformer shipment arrives at your door. An example is A-C's *new* equipment for simulating transportation conditions. It has a twofold benefit:

1. Provides information on safe crating and boxing.
2. Produces useful facts on improvement of transformer design.

It's assurance that transportation rigors will not affect transformer performance.

Previously A-C engineers traced test shipments over the country. This was time-consuming, but out of it came important results like A-C's floating load method of shipping transformers in 1952, and the pallet-bonus crate introduced by Allis-Chalmers in 1954.

But now, with this *new* shock-test equipment, results can be had faster and more accurately than before. Now, every newly designed transformer is shock tested in order to check its mechanical strength and prove the design calculations. At the same time, this "road test" checks the crate design for possible improvement.

A-4903

PRE-TESTED
SAFE TRANSIT
SHIPMENT
This PACKAGED PRODUCT meets the pre-testing standards established by the National Safe Transit Committee and will withstand ORDINARY transportation and handling hazards
NATIONAL SAFE TRANSIT COMMITTEE
MAKE
SAFE HANDLING
YOUR JOB!

Look for the seal on A-C transformer shipments which certifies approval by National Safe Transit Committee.

Allis-Chalmers complete package-testing program is just one of many steps A-C takes to produce better distribution transformers. It will pay you to get complete information. Why not call your nearby A-C office today? Or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

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